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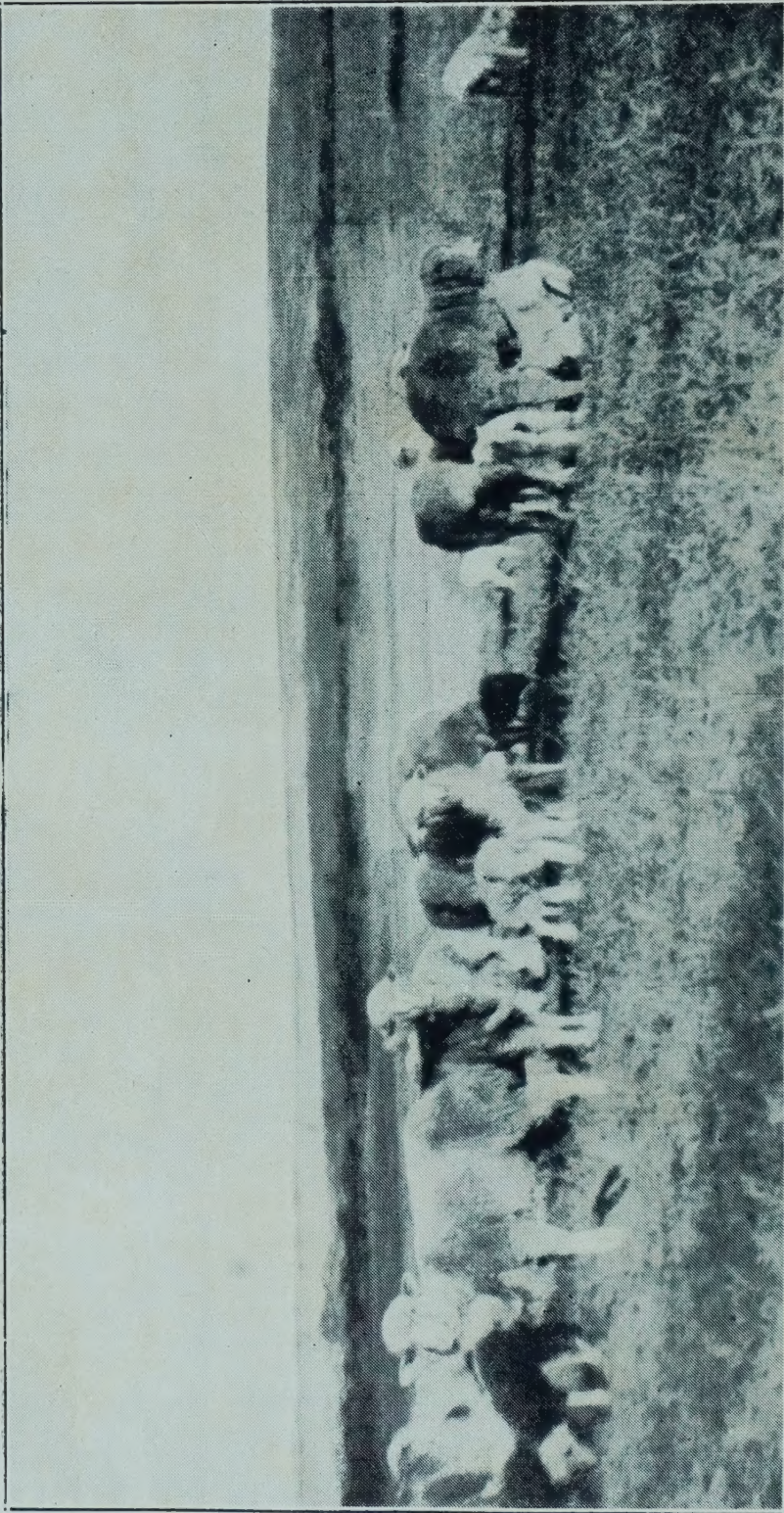












Merino sheep in Rhodesia.  
Ewes and new-born lambs at Inyagura farm (see letterpress).



THE RHODESIA  
**Agricultural Journal.**

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*Editor* - - *William E. Meade.*

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## Editorial.

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*Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.*

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**The Departmental Annual Report, 1927.**—Readers will observe that we publish in this issue of the Journal a number of extracts from the annual report of the Department of Agriculture as presented to the Legislative Assembly. We do so because otherwise we think that much of the subject matter of the report will escape the notice of the people whom it most concerns—the farmers of this Colony. We have not space to publish the report in full, so we have made a point of extracting references to the research work in progress. Thus readers will find information in regard to the year's work at the various experiment stations, boring operations, tsetse fly investigations, diseases of tobacco and oranges, and an investigation into the mineral content of natural pastures. These are all matters which have a direct bearing upon the advancement of the agricultural industry of this Colony, and we think that what is written will be read with



great interest. The report of the Director of Veterinary Research is reproduced almost in full, for it contains data of the greatest importance, and is a valuable contribution to the knowledge of animal diseases in this Colony. The report of the Secretary, Department of Agriculture, records the activities of the Department generally, and we commend this to the perusal of our readers.

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**The Journal.**—We think it worth while to record the fact that 2,500 copies of the Journal are now being printed. The circulation has been steadily increasing until the present high-water mark has been attained. Although our subscribers' list includes the great bulk of the farmers in this Colony, there are some who, having defaulted in the matter of the 5s. subscription, no longer get the Journal. We think they will have cause to regret their slackness, for many back numbers are now unprocurable. Others have not seen fit to subscribe, and we presume feel fully competent to carry on their farming operations without the assistance of the Department. We think they are foolish, for no matter how experienced and competent a man may be, he cannot afford to ignore the advice of those whose business it is to make a special study of the agricultural conditions of this Colony.

The Journal is published at a nominal price in order to make it available to all, and we do not think there can be any ground for complaint on the score of expense. It is desired that every farmer should benefit by what is written, and we would ask subscribers, particularly secretaries of farmers' associations, to help us in our endeavour to enrol everyone who is not at present getting the Journal.

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**Rise in Hide and Leather Prices.**—We observe from the report of the National Bank of New York for February, 1928, that one of the immediate problems with which the shoe industry of the United States is having to contend is that created by rising prices of hides and leather. During the past year prices of hides have risen 65 to 75 per cent., and leather prices, though not yet fully discounting the advance



in hides, have also had a substantial increase. That shoe prices in turn will have to be advanced to conform to the trend of hides and leather is regarded as inevitable.

The report goes on to state that advances in hide and leather prices have as their basis the world-wide exhaustion of surplus supplies. Commenting on the situation as to leather in a recent address before the annual convention of the Shoe Manufacturers' Association, Mr. Fraser M. Moffat, President of the Tanners' Council, said:—

“During the past year stocks of leather of all kinds in this country have decreased in percentages ranging from 32 per cent. in the case of sole leather to 10 per cent. in other lines. In many instances stocks of leather are at their lowest record point. In sole leather, in which you are all interested and which is particularly vital because of the long time necessary to produce it, there is practically no visible supply unsold.”

The United States is unable to supply her requirements of leather internally, and is to-day importing large quantities of hides. Boot and shoe production is increasing, but the total available stocks of hides and leather on 30th November, 1927, was approximately 11 per cent. less than a year previous. The position is such that the possibility of leather substitutes is being considered.

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**The Cattle Industry.**—We publish elsewhere in this issue of the Journal a summary of the number of cattle in the Colony at the end of December, 1927, with comparative figures for the preceding nine years. From this it will be seen that the European-owned cattle at the date mentioned numbered 954,835, and native-owned cattle 1,370,567. This represents a decrease in the former of 36,381 and an increase in the latter of 173,101 in comparison with the previous year's figures. It will be seen that up to the year 1925 steady increases were recorded in the number of European-owned cattle and that the total has declined in the subsequent years.

In our opinion the decrease recorded is not altogether to be regretted, for it means that a large proportion of scrub



stock has found its way to the butcher. The quality of our herds is higher to-day than it has ever been, and there is a general improvement in the methods of management and feeding. The prospects of the cattle raising industry appear to be brighter than they have been for some time, and once the difficulty of obtaining good bulls has been overcome, we expect to see substantial progress made in this essential branch of the agricultural industry.

A considerable increase is recorded in the number of cattle exported from the Colony during the first six months of the current year. The total of all cattle exported is 44,960, as compared with 31,779 for the corresponding period of 1927. Of this total 19,537 were exported overseas on account of the Imperial Cold Storage Co., Ltd., compared with 14,149 for the six months of the previous year; 17,432 to the Belgian Congo, compared with 8,988 for the six months of 1927; and 5,564 to Johannesburg, compared with 1,923 for the corresponding period of 1927. These were all slaughter animals. Breeding cattle exported to the Belgian Congo numbered 1,577, as compared with 18 in the six months of 1927. The total number of all cattle exported from Southern Rhodesia in 1927 was 46,898.

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**The Land Bank.**—We observe from the report of the Land and Agricultural Bank of Southern Rhodesia that the number of applications received for loans during the year 1927 was 410 for advances aggregating £357,143, as compared with 324 applications for £342,986 in 1926. The loans approved by the Board and accepted by applicants numbered 365, involving a total of £272,947.

A marked feature in applications received during the year has been the requirements for tobacco-curing barns, grading sheds, and for tobacco production generally. In considering applications, the Board has felt it to be desirable to assist in financing a farmer in the erection of only two or three barns and in the cultivation of an appropriate acreage. Applicants with barns have almost invariably been advised that any additional barns required must await profits derived from those already constructed. The report goes on to state



that although the Board adopted this attitude and refused assistance, it is to be regretted that many of these applicants found ready credit facilities from merchants, which permitted a venture in tobacco far beyond the resources or ability of the farmer to bring his enterprise to a favourable issue.

A schedule attached to the report shows that bonds bearing interest at 8 per cent. or more, for a total of £19,095, were taken over during the year, as against the figure of over £166,000 shown in the Board's report for the period ended 31st December, 1925, and £41,000 for twelve months ended 31st December, 1926. From these figures, and in view of the fact that the Board has not declined to take over any sufficiently secured bond, bearing interest at 8 per cent. or more, incurred in connection with *bona fide* farming operations, it may be inferred that few farmers, if any, whose requirements fall within the £3,000 limit of the Land Bank Act, are now burdened with onerous bonds.

It is satisfactory to note that up to the 31st December last no debtor to the Bank has had his estate adjudged insolvent. This fact is particularly gratifying, as the Bank has in some instances aided a farmer at a time when his position, except for such aid, would have been hopeless, and it is pleasing to record that more than one farmer so re-established recognises that his improved position is due entirely to the Bank's aid.

Farmers desirous of making use of the facilities provided by the Land Bank are advised that Bulletin No. 686, describing its functions and method of operation, can be obtained upon application to this Department.

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**A National Effort.**—Most of our readers will be familiar with the contents of the circular issued by the Rhodesian Tobacco Gift Fund. For the benefit of those who have not received the circular we may state that the express object of the organisation is to induce and assist every Rhodesian to spend a fixed sum of money for the delivery to friends in the United Kingdom (or elsewhere) of Rhodesian cigarettes and tobacco. The president of the fund is His Excellency



the Acting Governor, and vice-presidents are the Premier of the Colony and Sir Ernest Montagu, M.L.A. The central executive includes the mayors of the various municipalities, representatives of public bodies and prominent personages. The organisation is thus thoroughly representative of the community.

This is a practical effort at self-help, and as such deserves the whole-hearted support of every Rhodesian. A great deal depends on the attempt to establish pure Rhodesian brands of tobaccos on the British market, and no stone must be left unturned to ensure the success of this initial venture. We believe the scheme as outlined in the circular is a sound one and well calculated to attain the object in view. We trust there will be no holding back, and that the response to the appeal will be immediate and universal. The address of the secretary is P.O. Box 713, Salisbury.

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**The Imported Meat Trade of Great Britain.**—We observe from Weddel's Fortieth Annual Review of the chilled and frozen meat trade that the importations of frozen and chilled meat into the United Kingdom during 1927 amounted to 946,776 tons, as compared with 930,035 tons in 1926, an increase of 16,741 tons, or 1.8 per cent. Chilled beef shows an increase of 36,692 tons, and frozen beef a decrease of 29,336 tons, so that in weight the imports of beef were very little heavier. In quantity, however, the increase amounted to 270,289 quarters, the explanation being that the average weight of the quarters received from the River Plate last year was lower than in the preceding year.

The total importations of mutton from all sources amounted to 5,374,598 carcasses, as compared with 5,605,290 carcasses in 1926, a decrease of 230,692 carcasses, or 4.1 per cent. The individual totals, however, show greater variation. Australia sent 135,180 carcasses more than in 1926. Against this New Zealand shipped 166,245 carcasses fewer. From the Argentine Republic there was an increase of 276,245 carcasses, counterbalanced by an almost identical decrease from Patagonia, while Uruguay failed to reach the 1926 total by 157,680 carcasses.

The total of 9,611,170 carcasses of lamb imported last year is easily a "record," having exceeded the previous highest total by 703,613 carcasses. The increase of 1926 was



1,330,329 carcasses, or 16 per cent.; but was offset to some extent by the lighter average weights of the carcasses. Australian shipments were smaller by 354,887 carcasses, but from all the other sources of supply heavily augmented shipments were received. New Zealand, with an increase of 364,277 carcasses, for the first time exceeded the five million mark. Argentina had a large increase of 853,360 carcasses, and Uruguay a relatively larger one of 309,770 carcasses. Patagonia made a good recovery from the preceding year's drop in supplies, with an increase of 142,634 carcasses.

Another considerable falling-off in arrivals of frozen beef has to be recorded, the total of 986,346 quarters imported being 544,850 quarters, or 35.6 per cent., smaller than the 1926 total of 1,531,196 quarters. The heaviest decrease was in respect of Australian shipments, which declined by 275,864 quarters, but New Zealand's drop from 267,068 quarters to 131,060 quarters was perhaps more significant. From Argentina there was a comparatively small decrease of 48,084 quarters. Uruguay shipped to the United Kingdom only 34,747 quarters, against 117,470 quarters in 1926.

Importations of chilled beef during the year amounted to 6,585,429 quarters, against 5,770,290 quarters in 1926, an increase of 815,139 quarters, or 14.1 per cent. Actually, the Argentine Republic sent 964,207 quarters (or 18 per cent.) more than in 1926. Shipments from Uruguay were reduced by 204,837 quarters. After an interval of two years Brazil resumed the exportation of chilled beef, the total quantity received amounting to 55,769 quarters.

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**The International Beef Trade.**—We notice from the *Imperial Food Journal* that no cattle from Canada have been shipped to Great Britain since the spring of 1927. We notice also from the same source that the shipment of New Zealand beef, boneless beef and mutton to the United States of America is becoming greater, and that the New Zealand Meat Producers' Board is now considering a trial shipment of chilled beef. Further, that Argentine beef is barred from entry into the States through the prevalence of foot-and-mouth disease. The query naturally arises as to why the shipment of Canadian cattle to Great Britain has ceased. The answer is that the supplies have been diverted to the United States, and we find that in 1927 over 204,000 head went to that destination.



From such information as we have been able to collate it would appear that the position which we apprehended some time ago is at hand, and that the United States is short of cattle. Whether the position will be remedied by greater production we cannot say, but we note that in the last two years the number of cattle and calves has decreased from 59,122,000 to 55,696,000 head. In 1925 the number of cattle received at all the public markets in the States was 17,116,789; in 1927 the total had dropped to 16,258,224. These figures explain the reason for importations.

The Secretary of the Department of Agriculture at Washington reviews the position as follows:—

“Here is what has taken place in the cattle industry in the last ten years: Cattle production was greatly expanded during the war in response to demands for adequate supplies of beef for the allied forces. When the war closed the industry found itself with the largest number of cattle on hand and the largest potential production capacity in the history of the country—both much in excess of ordinary peace-time requirements at remunerative prices.

“During 1920 and 1921 there was a decline in cattle prices of over 60 per cent. in 16 months, and for the next four years enforced liquidation held prices at extremely low levels, actually below pre-war prices over a considerable period of time. During this period cattle slaughter greatly exceeded production, and cattle numbers declined 11,000,000 head or 17 per cent. in seven years.”

The report of the National City Bank of New York for February, 1928, sums up the position as follows:—

“Symptoms of a pronounced change in the cattle history have been apparent for several years, and in the last year a general advance has taken place in all kinds of cattle, including cows and calves. In but few years in the history of the cattle business have values been marked up so rapidly.”

Readers will no doubt be aware that the movement which has been set on foot in Great Britain to pursue all possible means for the eradication of the disastrous outbreaks of foot-



and-mouth disease has culminated in a general attack upon the unrestricted importation of beef from countries in which the disease is prevalent. Since the exclusion of fresh meat from the Continent of Europe, South America has been the cynosure of all eyes, and the British Government is being pressed for legislation to subject chilled meat to a lengthy period of quarantine.

We notice in the same issue of the *Imperial Food Journal* statements to the effect that "there is abundant evidence that foot-and-mouth disease has the upper hand in the South American States, and to such an extent as to be practically ineradicable." Also that "shipments from South America for the first four months of this year are down by nearly one million quarters already (mostly shipped to Britain). The fall in South American exports to Britain would be greater but for the fact that this country is now being made the centre of disposal of a very big proportion of what has heretofore gone to the Continent as frozen, where business is difficult. It is shipped to Britain as frozen, and commands a ready sale at much better prices than it would fetch on the Continent as frozen." We learn further that Canada has banned South American carcase meat on account of foot-and-mouth disease, permitting only canned meats from that quarter; and that Ireland, since the outbreak of disease there, has also tightened up. The position is full of interest for the cattle producing countries of the Empire.

By the time these notes appear in print a shipment of 140 Rhodesian cattle will be on its way to England, and we shall await with great interest details of sale. The animals, which are mainly of the Aberdeen Angus breed, have been specially fed and prepared for slaughter. The ages range from two to four years, and in the opinion of those competent to judge, the consignment in point of quality is the best that has ever left South Africa for the European market.



## Extracts from the Report of the Secretary, Department of Agriculture, for the Year 1927.

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**General.**—During the year under review the demands on the staff have been exceptionally heavy, and at times it has been difficult to meet all requests made by the farming community for information and advice. New settlers in particular require guidance and assistance, and whilst it is admitted that the Department cannot fully meet all the demands made, this is in no way due to the members of the staff, who do not spare themselves in their efforts to help all those carrying out agricultural pursuits or stock farming.

In order to make the best use of the technical staff it is very desirable that farmers' associations should do their utmost to co-operate with and assist the Department. It is not infrequent that requests for expert advice are received from individual farmers in areas recently toured by officials of the Department, and if it is at all possible, farmers should endeavour to make use of experts when they are in their district. At the beginning of the year all farmers' associations were circularised and informed that it was proposed that technical officers would make two or three tours of each district during the year and give lectures or demonstrations where desired. It was then suggested that local farmers' associations might select farms for carrying out demonstrations which would have been useful and instructive, but for some reason the general desire seemed to have been to get officials to attend farmers' meetings. As there is frequently a good deal of general discussion at these meetings not always relating to farming, more valuable advice and assistance might be obtained from practical demonstrations and discussions carried out on the land. The reasons for and against different methods of farming can best be explained and discussed when results, good or bad, can actually be seen by those desiring information, and for this reason farmers' meetings may not always be the most suitable place for dealing with matters relating to the growing of crops, or other matters pertaining to farming. Farmers are, therefore,



asked to consider the methods of expert advice likely to give the best results, and any suggestions put forward which are likely to assist in this direction would be welcomed.

**Maize.**—The average yield of maize per acre, of approximately 6.2 bags, is higher than usual, but with better farming this average might still be considerably increased. In the maize competition plots the average yield worked out at something over 22 bags per acre, and maize growers would be well advised to give more attention to the question of obtaining a better return per acre from their crops. There are many reasons for low yields of maize, and amongst these might be included low rainfall, poor or starved soil, dirty lands, due probably to the grower planting out a bigger acreage than can be properly worked, planting too close, with the result that the cobs are stunted and in many cases no cobs form. The latter is not an uncommon fault with new growers, many of whom seem to think the closer they plant the heavier the yield will be. As maize competition plots are entered from most districts, much valuable knowledge could be obtained from visiting these plots and studying the methods of planting, spacing, cultivation, manuring and general treatment of the crop. When it is remembered that entries for the maize growing competition plots include many well-known successful growers, it will be realised that these farmers are not yet satisfied that they are getting the best possible return from their land, and other less successful growers and new settlers who propose to grow maize could profitably follow the example of those who continue to carry out experiments to enable them to get a higher yield per acre. The work done by the Rhodesian Maize Growers' Association, in connection with maize growing competitions, is deserving of the highest praise. Much time and thought is given to the work, and the educational results being obtained are most valuable.

**Ground Nuts.**—The average yield of 8 bags of ground nuts per acre is, as stated in the Chief Agriculturist's report, unduly low. On the Government Gwebi Farm the average yield obtained was 20 bags per acre, and the land on this farm is not by any means outstanding for the growing of monkey nuts. The crop should show without difficulty an average of over 10 bags per acre, and a little more attention would probably produce a heavier average yield and provide a more remunerative return to the grower. It is, of course, possible that numbers of farmers are merely planting a few acres



to see whether their land will grow ground nuts, and little care or attention is given to the crop after planting. A small acreage well done would, however, give better results, and prove a more reliable test than a larger area which has been more or less neglected. To grow any crop successfully the best methods of farming must be followed, and the growing of ground nuts is no exception to this rule.

**Tobacco.**—The tobacco crop of 19,175,000 lbs. exceeded the previous best yield by 13,861,814 lbs. Unfortunately, the increase in the production was so rapid that there is likely to be difficulty in satisfactorily disposing of the crop. As in the case of the cotton boom two years ago, the Department urged moderation in the planting of tobacco, but when it becomes known that numbers of growers have disposed of a crop such as tobacco at highly remunerative prices, it is almost inevitable that many established farmers and new growers will apply themselves to growing the popular crop, with the result that production must increase for a time by leaps and bounds and the market gets flooded.

**Cotton.**—It was not anticipated that there would be any increase in the cotton crop, but satisfactory progress is being made at the Cotton Seed Breeding Station at Gatooma, and there is every possibility of breeds suitable to Southern Rhodesian climatic conditions being established, and when that stage is reached, more attention no doubt will be paid by farmers to this crop.

**Wheat.**—The growing of wheat is receiving more attention from farmers with suitable land, and it is hoped that more will be done to extend the acreage of this important crop. Many experiments have, and are still, being made by the Department with different varieties of seed, and no doubt further varieties, suitable for the conditions of the Colony, will eventually be established.

Other crops grown are more in the nature of side lines, and are produced more for home use than for export, with the exception of potatoes, for which there are occasional demands from adjoining countries.

Attention might again be drawn to the value of sweet potatoes for stock feed, and it is surprising that this crop is not more generally grown for dairy stock and pigs.

The total area under cultivation for summer crops for the year 1926-27 was declared at 346,083 acres, as against 355,500 acres for the previous year.



**Cattle.**—The price for good slaughter cattle has advanced appreciably during the year, but the price offering for poor classes of stock has shown little or no improvement. Good dairy stock has been in demand, and for this class of animal very good prices are being realised. A good deal of culling has been done in dairy herds and also amongst beef breeds. The effect of this will gradually become more noticeable, and by keeping better animals in both breeds cattle owners will find they are working on a sound and more profitable basis. The export figures for the year show a considerable falling off, but this was not unexpected, as, on account of the dry season, it was almost impossible to send any cattle to the Union for slaughter purposes for overseas markets after the end of May. In the previous year a large number of animals was exported on the hoof *via* Messina by the Cold Storage Company, and no doubt had grazing been available a similar number might have been sent out of the country during 1927, but, as stated above, lack of feeding along the stock routes restricted the export total for the overseas markets.

The totals of cattle exported during the last six years are as follows:—

1922	...	...	...	...	...	...	...	...	23,938
1923	...	...	...	...	...	...	...	...	34,841
1924	...	...	...	...	...	...	...	...	50,770
1925	...	...	...	...	...	...	...	...	60,545
1926	...	...	...	...	...	...	...	...	74,646
1927	...	...	...	...	...	...	...	...	46,898

**Sheep Experiments.**—The sheep experiments being carried out have not been altogether successful, but this has been due more or less to the advice given with regard to proper treatment of the sheep not having been followed. Where care has been exercised to dose sheep regularly for wire worm, to provide sufficient succulent feed and to prevent the animals from drinking from pools of stagnant water, the results have been entirely satisfactory. The lessons learnt during the year, however, will prove valuable, and the coming year will probably show much better results. Many parts of the country are undoubtedly suitable for sheep, but this class of animal requires probably more care and attention than is generally appreciated, and until sheep owners realise this, headway in sheep farming will be slow, and losses are likely to be heavy.



## TECHNICAL BRANCHES OF THE DEPARTMENT.

**Chief Agriculturist's Branch.**—This branch of the Department deals with all matters relating to crops and agriculture generally, and the Chief Agriculturist is generally responsible for the efficient working of the Matopo and Gwebi Farms, and also the Agricultural and Tobacco Experiment Stations in Salisbury.

It will be noted that in his report the Chief Agriculturist draws attention to the desirability of growing more legumes for green manuring, particularly in Matabeleland. It may be considered that in many parts of Matabeleland the rainfall is so light that the growing of crops in any quantity is hardly justified, but a very good example of what can be done with a short rainfall may be seen at the Municipal Experiment Station at Bulawayo. This station gives an excellent illustration as to what sound farming methods can do, not only in favourable but also in unfavourable seasons. The results obtained there are a credit to the manager, and the Bulawayo Municipality are to be congratulated on the good work they are carrying out.

Another important matter touched on by the Chief Agriculturist is the general lack of hay cutting by owners of stock. In an unfavourable season many animals which die from poverty might be carried through by the provision of a few stacks of hay. The expense of cutting hay is not a heavy item, and salt is not costly, so there is no great reason why farmers should neglect this important feed for stock and which is most essential for animals in poor condition during the winter months. The value of the number of animals saved would in most cases far exceed the cost of providing the necessary hay.

Interesting information concerning the costs of growing different crops at the Gwebi Farm will be found in the report, and although no amount is included for European labour or supervision, interest on capital invested in land, stock or implements, or for depreciation, the figures shown are valuable. No doubt at a later date a more elaborate system of costing will be introduced, and this should be of the greatest value in showing generally the profitable and unprofitable sides of farming under local conditions.

Sheep have not proved successful on the Gwebi Farm, and it may be considered advisable to drop this class of stock



on the farm in the meantime and extend operations in other directions. It is likely that sheep will do better on the Matopo Farm than at Gwebi, as the veld at the former is more suited to this class of stock.

Valuable work has been carried out by the Horticulturist, who is also highly efficient in citrus and deciduous fruit culture. Growers can now be advised as to the varieties of trees most suitable to Southern Rhodesia, and full advantage is being taken of the official responsible for advisory work on this side of the Chief Agriculturist's branch.

The Agricultural and the Tobacco Experiment Stations are carrying out most useful experiments, and full advantage of these stations is taken by farmers and much valuable information is obtained.

It will be noted that enterprising farmers in Melsetter district are experimenting with coffee and tea plantings, and if these industries can be established, the benefit to a district situated so far from a railway will be of the greatest value. The cost of transportation of heavy and bulky crops, such as maize, from Melsetter district is prohibitive, and the results obtained from the experiments now being carried out with coffee and tea will be awaited with interest.

The sugar cane experiments in Wankie district are being extended, and in the near future it is likely that considerable developments will take place in this new and promising industry.

During the coming year it is hoped to carry out experiments with farm tractors equipped with producer gas attachments.

**Stock Adviser's Branch.**—From the report of the Stock Adviser it will be seen that more care is being exercised in the selection of animals, and it is evident farmers realise that poor class animals are a liability, and that it only pays to keep good beasts. On the recommendation of the Stock Adviser a good deal of culling has been done in some herds, and in other cases herds have been graded by the Stock Adviser, with the result that the owners know their profitable and unprofitable animals. There is a steady demand for good bulls and dairy cows, and these are difficult to obtain.



It will be noted from the return of animals purchased under the Government Loan Scheme that the favourite breed at present is Frieslands, and this breed accounts for slightly over 50 per cent. of the animals purchased.

**Dairy Branch.**—From this report it will be seen that farmers carrying out dairying operations had many adverse conditions to contend with during the year, but in spite of this the industry has made progress. Heavy frosts in May, June and July did much damage to the natural winter grazing, and, as stated by the Dairy Expert, such winter feed as had been conserved was in many cases all too quickly consumed. The lesson from this has, no doubt, in numerous instances, been taken to heart, and a better reserve of winter feed will be provided to guard against conditions such as those encountered last year. It must be remembered that dairy stock, probably more than any other breed of cattle, require good warm housing and feed in the winter, and unless this is provided, the milk supply must decrease and profitable dairy cattle are likely to become a liability to their owners.

It is noticeable that farmers are giving rather more attention to milk recording, and this is a most necessary essential where dairy cattle are concerned. Better cows and better feeding will amply repay the dairy farmer, and the farmer who does his good cows well is bound to obtain a better return than the man who relies on double the number of veld-fed animals for his milk supplies. Milk recording will very soon show the profitable cows in herds, but this must be carried out under proper supervision.

The road motor services will prove of the greatest value to dairy farmers in districts in which these services are operating; and as dairy methods improve, the support to these services is likely to increase.

The reason for the decrease in cheese making in the Colony is explained by the Dairy Expert, and it will be noted that cheese costing 1s. 1d. per lb. to make in the Union could be bought in Durban at from 8d. to 9d. per lb., and could be landed in Bulawayo at about 10d. per lb. In view of this state of affairs it was more profitable for dairy farmers in Southern Rhodesia to send their cream to a creamery rather than continue their cheese making operations. Later in the



year there was an acute shortage of cheese throughout South Africa, with the result that the price appreciated beyond the actual value of the product. This state of affairs is unsound and unsatisfactory both for the dairy farmer and the consumer, but last year's experience will probably cause more care to be exercised to prevent a similar situation arising.

The pig industry is making satisfactory headway. Good prices have been paid by local factories for bacon pigs, and in addition to local requirements, over 2,000 pigs were exported, chiefly from Matabeleland, during the year.

The result of better housing, feeding and management of pigs is reflected in the improved quality and uniformity of animals supplied to bacon factories or for export. Given reasonable care and attention, pig farming should prove a profitable undertaking at the prices paid by bacon factories during the year, but like other classes of stock which are allowed to forage for a living, neglected pigs are more likely to be a liability than an asset. Good clean wholesome food is just as necessary for pigs as for any other animal, and the old idea that anything was good enough for a pig is no longer generally accepted. There is still room for improvement in the methods adopted by some pig breeders, but experience will show that good housing, feeding and attention will more than repay the slight additional cost and work entailed.

**Poultry Branch.**—In spite of the efforts made by the Experts, the poultry industry does not show the progress one might expect. For some unknown reason, if any side line in farming is to be neglected, poultry keeping is usually the first to suffer. This may be due to the mistaken idea that poultry can look after themselves. No doubt this may be more or less correct, but lack of attention means fewer eggs and a decline in profits. It is just as essential to look after poultry properly as any other class of live stock on a farm, but if crops are likely to bring in a profit, the inclination seems to be to neglect the poultry side. This is to be regretted, as dairy cows, pigs and poultry provide the monthly cheque, which in many cases successfully carries the farmer over lean times.

**Cotton Specialist's Branch.**—The cotton-growing industry at the present time is more or less in the experimental



stage, and very small acreages are being planted to this crop. The report of the Cotton Specialist, however, shows that satisfactory progress is being made in establishing jassid-resisting strains, and within a few years it is anticipated that a general distribution of seed suitable for the conditions of the country will be possible. Until this can be done little cotton will be grown except for crop rotation purposes. If satisfactory jassid-resisting and early-maturing varieties can be established, the growing of cotton would no doubt receive a good deal of attention, as it would then be an economic and paying proposition.

At different times during the year Sir James Currie, a Director of the Empire Cotton Growing Corporation, and Sir William Himbury, Managing Director of the British Cotton Growing Association, visited the Colony and were able to see a good deal of the country, with which they were favourably impressed.

It is unfortunate that the three ginneries in which the Government, the Empire Cotton Growing Corporation and the British Cotton Growing Association are interested have been so little in commission, but it is hoped when suitable seed can be distributed that they will be run profitably.

**Entomological Branch.**—As farming operations extend it is to be expected that more crop and other pests will have to be dealt with by the Entomologists. A good deal of time and attention have been devoted to tsetse fly investigations, and the position regarding this menace in Lomagundi district has shown an improvement. The erection of fences and the destruction of game within the boundaries of the fences have certainly proved beneficial, and it is hoped to extend the fencing beyond the present line with a view to the further testing of this means of combating the tsetse fly menace.

If by fencing and destroying game a barrier zone can be created, the cost of considerably extending this method of driving back tsetse fly would be fully justified. In the Gatooma area there has hardly been time to allow of a statement being made as to the results obtained from the work being carried on there, but if fencing and game destruction are proving satisfactory in Lomagundi district, similar results may also be looked for in Gatooma area. In the latter area,



however, there is more likelihood of fly being carried by motor vehicles, but the question as to whether the carrying of fly in this manner will result in any real danger to stock owners in areas free from tsetse fly is somewhat indefinite. The thought, however, of having fly carried by any means to the vicinity of valuable cattle is very disturbing, and causes owners of animals a good deal of anxiety. The report of the Chief Entomologist deals fully with the matter of tsetse fly and trypanosomiasis, and the steps being taken to deal with these pests.

The selection of game sanctuaries in the Colony is a matter which has to be very carefully investigated on account of tsetse fly. Likely areas for game reserves, however, are under consideration, and it is anticipated that at a very early date a large area in Wankie district will be declared a game sanctuary. Other areas will be inspected, and the Chief Entomologist will probably be able to make definite recommendations in connection with the question of protecting game in further selected areas during the coming year.

**Irrigation Branch.**—During the year the branches of the Irrigation and Agricultural Engineer and the Hydrographic Engineer were placed under one control, and are now in charge of the Irrigation Engineer. The activities of this branch, which are very varied, and embrace matters not only affecting irrigation, include agricultural engineering generally and also all hydrographic and meteorological work.

The question of soil erosion is now having more attention from farmers than in the past, and frequent requests for advice are received in connection with this important subject, which, however, does not yet receive the consideration it deserves from land owners. The matter is one which should be dealt with in its early stages and before irreparable damage is done, and not left over as a question of no great urgency for another year.

Water boring has been carried out continuously during the year, and, although further water-boring drills have been purchased, the demand for boreholes during the year has been in excess of the plants available.

**Chemistry Branch.**—It is gratifying to note from the report of the Chief Chemist that the samples of soil received

for analysis are over one hundred per cent. in excess of the number received during the previous year. It has recently been stated that the soil and its productivity are the foundations of all agricultural systems, and Agricultural Chemists can furnish most useful information to farmers as to the suitability of their soils for growing any particular crop, and are able to give valuable advice as to the best methods for manuring or fertilising land to obtain the highest production. The successful farmer no longer employs haphazard methods of farming, and realises that to obtain the best results scientific methods of agriculture must be carried out. It is necessary, however, for the farmer and the agricultural scientist to work together, and agricultural chemistry plays a big part in the game of successful and scientific farming.

There is no doubt that the benefits of agricultural chemistry in relation to farming are of the greatest value, and it is evident that this is becoming more and more realised.

**Tobacco Branch.**—The report of the Tobacco and Cotton Expert gives very full details of the activities of this branch. The experiment of providing District Tobacco Advisers has on the whole proved successful, but the necessity for retaining the services of all the Tobacco Advisers brought over from America is not now so essential, as in every district there are a number of local growers with a good working knowledge of growing and handling tobacco who are always willing to advise and assist new growers.

With the more suitable buildings now available for curing, and the establishment of numerous grading warehouses throughout the country, the quality of the Rhodesian product should improve considerably, but until a market is established which can absorb the total production, growers would be well advised in the meantime to look to quality rather than quantity, and to spread the risk of farming as widely as possible by growing crops other than tobacco.

**Mycology Branch.**—Much useful research work has been carried out by this branch, and the reasons for failure in certain citrus crops have been closely investigated with satisfactory results. Tobacco diseases have taken up a good deal of the Mycologist's time, and his remarks on this subject will be of much interest to growers.



With the increasing acreage planted to crops, more plant diseases must be anticipated, but, as stated by the Mycologist, provided that control measures advocated are thoroughly carried out there is no reason to anticipate that these diseases will become a serious menace.

**Forestry Branch.**—It is satisfactory to find the increased interest now being taken in afforestation. The depletion of indigenous timber has been going on steadily for the last thirty years, more especially in the vicinity of towns and mines, and little has been done to replace the large forest areas cut out. Although in most cases the trees cut down send out new shoots, these, without any attention, develop into coppice growth, and areas at one time heavily timbered with fine trees now show what can only be termed scrub brush. Most varieties of trees on areas where the timber has been cut respond very quickly if they are given a reasonable chance to make new growth, and there is no doubt that a little attention in this respect is amply repaid by the results obtained.

The demand for forestry advice during the year under review has far exceeded that for any previous year, and although the forestry staff has been doubled, it is still hardly possible to meet all requests made for assistance and advice in connection with tree planting.

From the report of the Forest Officer it will be seen that the areas planted to trees at Mtao during the year amounted to 276 acres, and this must be looked upon as a valuable and increasing asset. The arrangement at Mtao for providing work for Europeans who are out of employment has proved satisfactory. At one time men out of work were given employment on road making, but this was both costly and unsatisfactory. At Mtao the men are able to live comfortably, and the nature of the work appeals to them far more than working on public roads. Hard work, regular hours and good food have a wonderfully good and bracing effect on these men, many of whom arrive at Mtao in a very run-down state of health.

The protection of indigenous forests against fire is a matter of the utmost importance, and large areas of valuable timber are now showing the benefits of the activities of the forestry officials in this direction.

The demand for transplants and seeds is increasing steadily, but farmers and others might do a good deal more for themselves in growing transplants, which is not a costly or difficult business.

Much leeway in afforestation has to be made up in this country, and some enthusiasts are now endeavouring to form an Arboricultural Society and to institute tree growing competitions throughout the Colony. A society of this nature can do much good, and the promoters deserve much credit for their initiative in starting the scheme.

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### NATIVE LABOUR.

In many instances the shortage of native labour has been acute, whilst in other cases the labour offering has been in excess of requirements. A good deal of the success or otherwise of obtaining native labour depends on the methods adopted by employers in handling their employees. It frequently happens that natives prefer to work for one employer at a lower wage than could be obtained from other employers. In a good many cases piece work has been tried on farms, and although it is stated to be fairly satisfactory, the inclination is for farm natives to scamp their work under this system, and this method of working may be more suitable for natives employed on mines than for those employed on farms. The general efficiency of native labourers improves very slowly, but farmers who can personally demonstrate how work should be done are likely to get more out of their native employees than the employer who gives instructions which probably in many cases are not understood by the native working for him.

There is little doubt that for successful and economic farming more efficiency in native labour is essential, and to obtain this increased efficiency will be a difficult matter for employers who are inefficient themselves. It is likely that at no distant date natives employed on farms, except those carrying out essential work, will demand to be released from work on Saturday afternoons and Sundays, and they will no doubt also demand better housing than is provided on many farms at the present time, and may insist on being given



better rations. They see the better conditions under which mine boys are employed, and similar conditions will eventually have to be granted to farm labourers. Farmers should, therefore, prepare themselves for this by endeavouring to get better and more intelligent work from their native employees. As the settlement of the country expands native labour difficulties must increase, and the most economical and efficient methods of farm management will have to be adopted. The system of planting large acreages is in many cases a form of agricultural speculation, unless the grower has an assured labour supply and is in a financial position to carry the crop through. It is very essential that the minimum number of not only native servants, but also of working animals should be employed. Good farming must be done, and endeavours made to increase the productivity of the land. As competition gets keener and farmers have to compete in the world's markets, the necessity for farming on efficient and up-to-date lines is very evident, and it would be well to remember that inefficient labour is usually a costly business. Labour-saving devices will assist matters, but these in many cases are costly, and are not within the means of many.

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#### LOANS FOR FARM DEVELOPMENT AND FOR PURCHASE OF STOCK.

The amount of £25,000 originally provided for farm development loans is now in its third course of distribution. This does not necessarily mean that the total of the amounts issued on loans has been repaid, but loans issued and re-issued for assisting farm development reached a total of £54,818 0s. 6d. at the end of December last.

## Boring in Native Reserves, Crown Lands, Farms, etc.

*[The following particulars are extracted from the annual report of the Irrigation Engineer for the year 1927. Since the report was written, an additional drill to be used for mining purposes has come into commission and another will shortly be added for farming purposes, making thirteen in all. We would direct attention to the table in the report showing the cost of boring operations, from which it will be seen that on private farms the average charge per foot, including casing, works out at 17s. 6d.—Ed., R.A.J.]*

Five additional drills of the combined percussion rotary type were brought into operation during the year, making 11 in all engaged on boring work throughout the Colony.

The additional drills came into commission at different periods throughout the year, and allowing for this, the strength was equivalent to  $7\frac{1}{3}$  drills working for a complete year.

The summary of footage drilled, cost per foot and aggregate yield per 24 hours is as follows:—

The total depth drilled ... ..	10,524 feet
Footage drilled per working month per drill ... ..	119.6 feet
Number of boreholes sunk ... ..	84
Average depth per borehole ... ..	125.3 feet
The average charge, including casing (all boreholes) ... ..	26/- per ft.
The aggregate yield of successful boreholes ... ..	731,932 gallons per 24 hours
Percentage of boreholes sunk yielding supplies of over 2,000 gallons per day ... ..	69.0%



In the following summary are shown the costs of drilling under differing conditions as to supply of transport, labour, etc. :—

	Transport and labour supplied by applicant.		Transport and labour supplied by Government.		
	Government farms.	Private farms.	Government institutions.	Crown lands.	Native reserves.
Total depth drilled ...	521 ft.	2,202 ft.	289 ft.	4,862 ft.	2,650 ft.
Footage drilled per working month per drill	130.25 ft.	142.0 ft.	96.3 ft.	123 1 ft.	101.9 ft.
Number of drill months	4.0	15.5	3 0	39.5	26.0
Number of boreholes sunk	5	19	3	44	13
Average depth ...	104 2 ft.	115.9 ft.	96.3 ft.	110.5 ft.	203.8 ft.
Average charge per foot (including casing)	18/8	17/6	40/9	26/7	31/8
Percentage of successful boreholes	80%	73.7%	33.3%	63.6%	76.9%

These costs are very low when the hard and fractured nature of the formations in which drilling has to be carried out in this country is considered, and reflect great credit on the Boring Superintendent, Boring Inspector and drill personnel.

The staff of the Boring Section consists of the Boring Superintendent, a Boring Inspector, 13 drill foremen, 1 assistant drill foreman, and 1 learner. Three of the drill foremen are locally-trained Rhodesian youths.

The appointment of a Boring Inspector for supervising the drills in Matabeleland has been amply justified by the results. Without this appointment it would have been impossible for the Boring Superintendent to have efficiently supervised the field operations.

The average cost per foot to private applicants is 2s. cheaper than the corresponding figure in the previous year's operations. This result is due to the fact that owing to the

large number of drills now available it is possible to carry out private applications all over the Colony with the minimum amount of extra expense for railage and transport charges. The higher average charge per foot for all boreholes is due to the boring on native reserves being included in the general schedule for the first time this year.

The boring charges on unoccupied Crown lands and in native reserves are higher than can normally be expected, owing to the fact that the severe drought of the previous season necessitated extra transport being hired to keep the drills supplied with fuel and water. Further, eight of the boreholes on Crown lands were near the fly belt in the Golden Valley area, and exorbitant rates had to be paid for the hire of transport, owing to the risk of infection to the cattle.

As regards native reserves, the conditions were particularly severe in the Gwaai Reserve, and it was difficult to keep the drill operating for full time—the expense is also higher here, as two deep boreholes were sunk through the basalt, the one being 502 feet and the other 417 feet in depth. Good supplies were obtained in each of these holes. Future drilling in a difficult portion of the reserve has in this manner been simplified, as the thickness of the basalt and the existence of good supplies in the underlying formation has been proved.

The low percentage of successes on the unoccupied Crown lands is mainly due to the difficulties experienced in the Trelawney area, where the percentage of successful holes was only 42.9 per cent. of those sunk, whereas in the remaining Crown lands the percentage of successes was 73.3 per cent.

The average cost of developing a good supply on an unoccupied farm is approximately £240, as shown by the figures in the schedule.

The low percentage of successes shown for Government institutions is wholly due to the fact that two boreholes were sunk without success in a restricted area in the neighbourhood of Milton School. The high cost of drilling is due to the heavy charges for fuel and transport in the neighbourhood of a town.



## The Year's Work at the Experiment Stations.

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*[The following extracts from the annual report of the Chief Agriculturist are a record of the work carried out at the Government Experiment Farms during the year 1927.—Ed., R.A.J.]*

**Gwebi Farm.**—The manager and his staff are to be congratulated on a highly successful year, in spite of a rainfall which only amounted to 26.38 inches and a season in which several long periods of drought occurred. Of a total of 588 acres under crops, maize occupied 332 acres and yielded 11 bags to the acre. Sunflower returned  $14\frac{1}{2}$  bags an acre, ground nuts 20 bags, potatoes 109 bags and oats  $3\frac{1}{3}$  bags an acre.

Cattle and pigs have continued to do extremely well, but in spite of the utmost care and attention the mortality amongst sheep was unduly high.

The Friesland herd was increased by the purchase of seven pedigree cows and heifers which were imported from the Union, bringing the total number of pedigree animals on the 31st December to 33 head. Grade Frieslands on the same date numbered 38. Many of these cows and heifers have put up very satisfactory milk records. Four young pedigree bulls bred on the farm were sold at the last Salisbury Agricultural Show sale and realised good prices. All calves are hand-reared and bucket-fed from birth; there was no mortality or sickness amongst the calves, which numbered 21. The grade Shorthorn herd, with the exception of some young bullocks, was disposed of during the year.

Fifty-five bullocks were fattened, some of which were sold locally and some in Johannesburg. An average profit of £2 per head was made.

The pigs consist of a herd of pedigree Middle Whites, with some Large Black sows for crossing purposes. Ten pure breds and 58 baconers were sold during the year.

The sheep flock, consisting of merinos, blackhead Persians and merino-wool Persians, numbered 209 at the beginning of the year and 177 at the end of the year. Seventy-eight lambs were dropped, but deaths accounted for 58 head of sheep of all ages.

During the month of January, 2,850 yards of eucalyptus wind-breaks were planted around the paddocks, and, in addition, a six-acre plantation of gums was set out. In both cases a good stand of trees has been obtained. Sufficient seedling gums have been raised to put down a further plantation of 13 acres in 1928.

Seed of the various crops grown on the farm was in considerable demand, and more could have been sold than was available. Revenue from this source amounted to £485.

Careful records have been kept of the actual cost of all farming operations, including the growing of crops and raising of live stock. In the figures given below no charge has been made for European labour or supervision, or for interest on capital invested in land, stock or implements, or for depreciation of live stock or implements, or, in the case of crops, for the value of the seed sown. Omitting these charges, but including all others, the cost of preparing 588 acres of arable land for crops was found to average 5s. 10d. an acre.

The 11-bag-an-acre maize crop cost 4s. 1d. a bag to raise, including cost of bag and sewing; while the 109-bag-an-acre potato crop cost 3s. 9d. a bag, or 4s. 8d. a bag if the return of only table and seed potatoes is taken into account. On the same basis sunflower seed cost 4s. a bag to produce, oats 12s. 1d. a bag, sweet potatoes (making no allowance for the value of the "tops") 12s. 2d. a ton of tubers, ground nuts on a 20-bag-an-acre crop 4s. 6d. a bag, bean hay 22s. 5d. a ton, maize and beans for silage 5s. 9d. a ton, and green manuring with a legume 10s. 10d. an acre.

Development work has continued; a range of six pig sties and feed room constructed of brick, under thatched roof, was erected; also post and rail fattening pens to accommodate 60 bullocks, together with an engine shed, in which a power grinding plant was installed.

The total cash revenue for the year was £3,804 6s., and, if allowance is made for certain other amounts still due to the



farm on the 31st December, the total cash receipts may be put at approximately £4,000.

**Matopo Farm.**—Progress at this centre was less satisfactory and all crops were extremely poor, except irrigated potatoes planted in August, which yielded a profitable return. Thirty acres of tobacco failed to prove remunerative on account of drought and a severe infestation of root nematode, the presence of which on land which had lain fallow for many years could not be anticipated. The equipment of the tobacco section was completed during the year by the erection of a grading shed.

The small herd of grade Friesland cows, the cross-bred sheep, and, in particular, the pigs, have continued to do well, and have demonstrated the suitability of the farm for better bred animals of these kinds. The grade Shorthorn herd has been disposed of.

On the 1st October Mr. Mainwaring, Agriculturist, was seconded to the farm in the capacity of manager, and it is confidently anticipated that under his management the task of developing the property and increasing its productivity will rapidly be accomplished.

Sales of stock and produce during the year realised approximately £600.

**Salisbury Experiment Station.** — The investigations carried on at this station are too numerous and of too intricate a character to be referred to at any length in this report. The more important general results are published yearly in an annual report of the station, and the outcome of any particular enquiry is made known by means of a report specially devoted to that subject.

During the year increased attention was given to the selection of wheat varieties exhibiting rust-resistant characters and to similar work towards improving the quality of the two most popular varieties of summer oat, namely, Kherson and Kinvarra. The selection of improved strains of sunflower and buckwheat was continued. The number of systems of crop rotation under investigation has been enlarged, and while the older established rotations continue to support the results previously obtained, the more recently initiated systems also promise to afford much valuable information.

Farmers are evincing increased interest in kudzu vine and edible canna. The value of the former, when once established, as a perennial forage and grazing crop has been amply demonstrated over a number of years, and the latter appears likely to become a popular pig and cattle feed. Judging by the demand for cuttings, many more farmers are now also putting down considerable acreages to sweet potatoes.

The work on the station has increased owing to the more frequent repetition of the plots, a system found necessary in order to reduce the time within which reliable deductions can be drawn.

In co-operation with the Chief Chemist, a modest commencement has been made in testing the effect of artificial fertilisers on pasture land.

Visitors to the station during the year numbered 200.

Eighteen introductions of new crops or new varieties were made, and free issues of seed and plants were as follows:—

To farmers in Rhodesia ... ..	289
To other Government farms in Rhodesia ...	302
To foreign institutions and experiment stations ... ..	151

Much time and labour is expended in preparing produce exhibits for local agricultural shows, for use at the High Commissioner's office in Great Britain, and for other objects pertaining to publicity.

Mr. H. C. Arnold has continued to manage the station with marked ability and initiative.

**Tobacco Experiment Station.**—A highly successful year can be recorded for this station, for which much credit is due to the manager. The total rainfall amounted to only 20.48 inches, but in spite of this the tobacco crop grew well, yielded heavily and was free from bacterial disease. The latter fact is significant, since, with the exception of a few introduced varieties, all the tobacco was raised from seed selected from the most disease-resistant plants of the previous year's crop, which was severely attacked by "spot." Some criticism was directed against the Department for selling a small amount of "treated" seed from this infected crop, but the resulting clean crop on the station in 1927 confirms the



view then held, namely, that the fears expressed by the persons referred to were unjustified. The utmost care was naturally taken to disinfect seed-bed covering and all material and buildings on the station which might have become contaminated by the previous diseased crop.

The station manager reports that the 1927 crop consisted of 40 acres, divided into 107 experimental and demonstration plots, comprising trials of fertilisers, green manures and tobacco varieties, together with various systems of rotation, and spacing tests, and the apprentices' own plots. The highest yield recorded was one of 1,500½ lbs. of flue-cured leaf per acre.

The crop was cured, graded and packed by the station staff and the apprentices, the total weight of tobacco secured being over 30,000 lbs., of which 22,215 lbs. was "brights and mediums."

Six apprentices completed their period of training and obtained salaried positions on farms, where they are understood to be giving satisfaction to their employers. The vacancies thus created were filled by new apprentices drawn from the following districts: Rusape, Que Que, Bulawayo, Nyamandhlovu, Enkeldoorn and Gwanda. In addition to instruction in all phases of tobacco production, the apprentices have received a number of lectures on other agricultural subjects from the various officers of the Department.

The small grade Friesland herd has continued to do well, and has fulfilled its dual object of supplying the station with milk and affording the apprentices an opportunity of learning approved methods of feeding, milking and managing dairy cattle.

The system of giving to each apprentice a plot on which he unaided does all the work in connection with raising the crop of tobacco has proved a great success in promoting keenness and imparting knowledge of the actual labour entailed in each operation.

Visitors to the station during the growing season of the crop averaged five a day.

Development work has proceeded; 20 acres of new land have been cleared and ploughed, the vlei has been prepared for winter crops, 6,000 eucalypts have been planted, the fire-

curing barn has been converted into two flue barns, and the water supply has been augmented by a power pump and two additional tanks.

### **Bulawayo and Gwelo Municipal Demonstration Stations.**

—Work at these centres was conducted on similar lines as in the past, and the results obtained over the periods the stations have been in existence are being summarised and tabulated by the Assistant Agriculturist with a view to early publication in the *Agricultural Journal*. To those willing to learn, the Bulawayo plots and the light sandy soil area of the Gwelo station have many valuable lessons to impart, and it is to be regretted that the farming public served by these small demonstration farms does not make greater efforts to profit by their proximity. The aggregate crop returns at Bulawayo over a period of six years, and those at Gwelo over four years, in spite of intervening seasons of extreme drought, should provide farmers in those parts of the country with cause for serious reflection as to whether the methods successfully adopted on these stations cannot more generally be followed. The continuation of demonstrational work at these two centres, through the mutual assistance of the municipalities concerned and the Government, must obviously depend upon the value which the institutions appear to be to the farming community.

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## Merino Sheep in Rhodesia.

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### THE INYAGURA FLOCK.

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By EDWARD G. F. SALMON, Manager.

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Sheep raising in Rhodesia, although still in its infancy, has made great strides in the last few years. The type of country best suited to this class of farming is not easy to find, nevertheless there are many districts very well suited to it, and others which lend themselves to "taming." The Makoni, Melsetter, Inyanga country seems to prove that its





Two six-and-a-half-months-old Merino wethers at Inyagura farm.  
Merino sheep at Inyagura farm.



Ewe and new-born lamb at Inyagura farm, June, 1928.







A young ewe born December, 1927. Note short grass.



One of the Merino rams at Inyagura farm.



Young ewe born December, 1927, at Inyagura farm.





conditions and climate are suitable for sheep farming. Merino sheep for the past 20 months have been run with marked success by Mr. W. Dickinson, of Inyagura Farm, which is situated 15 miles east from Baddeley Siding between Rusape and Headlands.

The sheep were supplied by the Government, to be run as an experiment, and the foundation stock consisted of three rams and ninety-three ewes, when actually installed. To-day, 8th July, the flocks are run in two paddocks, one flock of 105 ewes and three rams, to which must be added 43 lambs born this month; and the other flock of 47 young ewes and 44 lambs—a total of 200, plus 43 new lambs, after 20 months. The sheep are protected at night in vermin-proof paddocks of approximately 50 acres; inside the paddocks we have a low rock kopje with some big trees giving shelter, shade and dry footing.

Care has been taken that no vlei ground, or ground likely to collect water and form stagnant pools, occurs inside these paddocks. It has been found that ground which originally carried ordinary veld grasses, has produced a short sweet grass which the sheep eat right to the ground. It remains succulent long after other grasses are dry. If the grass gets too high or the sheep are put into a fresh paddock, the grass should be cut where possible with a mower and cattle allowed to graze it off for a few days before putting in the sheep. This will allow the sheep to find the shorter grass and also prevent grass seed getting into the wool and working its way into the skin. Burweeds, devil thorns, etc., can be eradicated by putting some picannins in the paddocks to pull out the plants before they seed, care being taken to remove and burn any such weeds.

The sheep are taken out of the paddocks during the winter months, and from about 8 a.m. to sunset are allowed to graze in old maize lands, teff fields and the high veld.

Green feed is grown, such as oats, barley, teff and thousand headed kale. The sheep are allowed to feed on the young growth when it is three or four inches high, producing in the case of oats and barley a strong growth of the crop. Maize is fed before the lambing season, about  $\frac{1}{4}$  lb. per head being given. This is spread out on the ground across the paddock. The sheep will pick up all of it.

Troughs made either from roofing iron, boards or hollowed-out trees are kept in the paddocks with a constant supply of salt and kerol as a lick. A bucket of salt, with a breakfast cup of kerol mixed well in, makes a very good lick. The most important thing to remember is that *A fence at the top of the cliff is better than an ambulance at the bottom.* Therefore, to guard against loss, dose against worms, and inoculate against blue tongue.

Dosing *must* be done once a month, and good results are obtained by giving alternatively each month the following:—Sir Arnold Theiler's remedy or Cooper's Dip tablets. If the latter are unobtainable, use one part Cooper's Sheep Dip powder to 10 parts common salt mixed thoroughly. Administer in doses of one teaspoonful per adult head, half teaspoonful for lambs up to one year. This must be followed by a second dose 10 days later.

Shearing is best done in September-October, just before the rains and hot weather commence. The sheep should be dipped within three weeks of shearing to give them full benefit of the immersion, followed 21 days later by a second dipping in fresh wash.

Docking and castration are done when lambs are two to three weeks old. If they are done at this age, no setback or after effects are suffered.

Weaning is done at the time when the majority of the lambs are over six months. They can be put with the wethers, care being taken not to allow access to the rams.

Rams must be well cared for, or the result will show itself in the progeny.

*[As regards dipping after shearing, the Live Stock Adviser considers that this should be done within six weeks, followed fourteen days later by a second immersion in fresh mixture.—Ed., R.A.J.]*



## Tsetse Fly in Rhodesia.

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### OPERATIONS IN LOMAGUNDI DISTRICT.

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*Extract from the annual report of the Chief Entomologist  
for the year 1927.*

The experimental operations inaugurated in 1925 have been prosecuted vigorously throughout the past year. The game fences have been maintained in good order, and elimination of game between the fences has proceeded unceasingly. The number of animals it has been necessary to destroy in the fenced area during the year has, however, amounted to a much smaller total than the number destroyed in the previous twelve months. The total reduction is to rather over one-half, but in 1926 the larger antelope, etc., formed nearly two-thirds of the total, whereas in the present year they form less than one-half. The reduction in the number of warthog and bush-pig is, however, slight. This reduction indicates the beneficial effects of the fences. Although a number of breakages have occurred, it is clear that the fences interfere effectively with ordinary game movements, and game paths along them in many parts show clearly enough that the wild game respects barbed wire in a considerable degree.

Close inspection carried out by three European inspectors during the year indicates favourable developments in regard to the distribution of the tsetse fly. No tsetse at all has been met with south of the fenced zone, although special attention has been paid to localities where the insect was found last year. No tsetse has been found on the formerly affected block of farms on the east side of the Hunyani River. Within the fenced zone the insect appears to have retreated appreciably, and except close to and north of the northern fence, no "fly" has been met with within about eight miles of the Hunyani River.

With the exception of the northernmost farm, Chiwe, all the formerly affected farms east of the Hunyani River have been free from trypanosomiasis throughout the year. Between the Hunyani and Angwa Rivers losses occurred, especially during the first part of the year, on four farms, but it is doubtful in what degree these deaths are accounted for by infection previously contracted. The experience of the present wet season in reference to the health of the cattle in these localities is awaited before definite conclusions as to the effect of the operations are drawn.

In September hunting operations were extended to an area north of the fenced zone bounded by the Hunyani and Mvume Rivers and the northern game fence.

In the Sipolilo sub-district, where driving back of the game has been continued under the direction of the Assistant Native Commissioner, the losses amongst native-owned cattle are reported to have diminished considerably, viz., twenty-nine cases in 1927, as against one hundred and forty-one in 1926. It has not, however, been possible to follow the effect of these operations as closely as immediately around the fenced zone.

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## Pit-Marking.

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### A DISEASE OF ORANGES IN SOUTHERN RHODESIA.

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*[The following is an extract from the annual report of the Mycologist for the year 1927. The disease "pit-marking" was less in evidence this year, although the rainfall was deficient. It was found to be impossible to carry out the irrigation experiments referred to in the report, but it is hoped to do so next season.—Ed., R.A.J.]*

A disease of oranges which has appeared from time to time upon citrus estates in this country has been investigated at Mazoe.



It is characterised by small brown markings in the pits of the rind, and is referred to as "pit-marking." In severe cases the spots coalesce to produce a bronzing of the surface of the fruit, usually at the blossom end, which renders it useless for export. Considerable time has been spent in the examination of diseased material, and it is now certain that the affection is of a physiological nature. It is found that rarely more than three layers of cells are affected. These are filled with a brown amorphous deposit, which appears to consist of oxidised fats. From general observations it is suspected that the disease is induced by dry weather conditions, and irrigation experiments will be carried out during 1928. In fertiliser trial plots it was found that there was no correlation between amount of disease and the presence or absence of any soil constituent.

The poor development of some 2,000 orange trees during the last five years has been found to be due to severe nematode infestation of the roots, whilst several fruit diseases have been shown to be identical with those commonly occurring in other countries.

Enquiries made in England in conjunction with Dr. Barker, of the Cambridge Low Temperature Research Station, have thrown light upon the incidence of certain diseases of stored fruit.

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## Another Tribute.

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*"I am enclosing a bank note to the value of ten shillings, which is to cover a two years' subscription to your monthly publication. I have been a subscriber off and on for so many years now that I would miss it very much were I not to receive it. And I am sure that it has been of the greatest assistance to me in my farming operations."*

## Pasture Investigations.

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*[The following extract from the annual report of the Chief Chemist for the year 1927 deals with a matter of the greatest importance to pastoralists in this Colony. We hope to publish in the next issue of the Journal an article by the Chief Chemist on the subject of the mineral content of natural pastures, showing the importance of mineral elements in nutrition and giving the results of a small preliminary experiment conducted at the Agricultural Experiment Station, Salisbury, last season. The data will show the influence of relatively small applications of artificial fertilisers on the mineral composition and feeding value of the veld grasses.—Ed., R.A.J.]*

While some preliminary work in connection with pasture and winter feed problems has been done in past years, our knowledge of methods of improvement and maintenance of natural pastures in Southern Rhodesia is extremely limited. The importance of the mineral elements in the nutrition of farm animals is becoming more and more universally recognised, and the fact that the soils of this Colony are deficient in certain minerals makes it imperative that investigation into the mineral content of natural pastures should be carried out, as it is well known that deficiencies in the soil may be reflected in the herbage and again in the grazing animal. Many cases of malnutrition in animals, due to mineral deficiencies of pastures, have been recorded in South Africa and other parts of the British Empire, and evidence is available that certain diseases, known to be caused through mineral deficiencies, do occur among cattle in this Colony. Research work to determine the most economic methods of cattle raising and suitable crops for the feeding of both range and dairy stock, including experiments on methods of improving and maintaining natural pastures, is of primary importance to the agricultural community. Research work along these lines is being conducted in different parts of the Empire, and is being aided by grants given by the Empire Marketing Board. In view of the apparent importance of



these problems to Southern Rhodesia, a tentative scheme has been drawn up in the hope that funds may be available at some future date to carry out similar investigations.

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## Argentine Cattle Prices.

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The freezing establishments in Argentina purchased a total of 3,233,787 head of cattle during 1927, for which they paid the huge sum of £35,945,585. In 1926 their purchases comprised 3,050,970 head at a total cost of £33,661,484.

The stock treated at the works are classified under three groups, and the weights and costs of each averaged. A summary of the particulars are given herewith, Argentine currency being converted into sterling at the normal rate of exchange, *i.e.*, 11.45 paper dollars to the £.

Group one comprises steers, bulls and work oxen, of which 2,662,244 were purchased in 1927. Their average weight was 1,135 lbs. and cost £11 6s. per head, giving a live weight cost per lb. of a shade under 2½d. In 1926 the total in this group was 2,253,396 beasts, averaging 1,170 lbs. The average purchase price in that year was £12 14s. a head, and cost per lb., live weight, approximately also 2½d.

The second group includes all cows and heifers to a total of 370,888. Their average weight was 843 lbs. and cost £7 9s., or 2½d. a lb., live weight. In 1926 the companies handled 560,316 head under this classification, the average weight being 851 lbs. and cost per head £7 6s.

Yearling steers and calves comprise the third group, 200,655 being treated. The average weight was 398 lbs., cost per head £4 11s., and per lb., live weight, 2¾d. In 1926 the total was 237,258 head, weighing 381 lbs., while the cost that year worked out at £4 5s. per head and 2½d. per lb. live weight.

It is interesting to note that 64.46 per cent. of the cattle treated by the freezing companies during 1927 were bought on the estancias, *i.e.*, on the breeding or fattening properties. Of the balance 33.01 per cent. were purchased in the Liniers cattle market, Buenos Aires; 1.47 per cent. in the Rosario market, and 1.06 per cent. at country fairs.—(*Pastoral Review.*)

# Dairy Buildings in Southern Rhodesia.

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## COW BYRE—TYPE II.

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By B. G. GUNDRY, Irrigation Branch.

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*[It is hoped to publish an article on the departmental design of cow byre known as Type I. at a later date.—Ed., R.A.J.]*

It is not proposed to discuss in this short article the relative advantages and disadvantages of the various types of cow byres which may be built, varying from a mere thatched shelter to an elaborate and costly building fitted out practically regardless of expense, but to give in some detail the description of a design which, while embodying all the more important features necessary to the health and cleanliness of the animals, can be built for a reasonable expenditure and be maintained at little cost.

The type of byre shown in the accompanying drawing has proved to be well suited to this country, and is recommended by the Government Dairy Expert and Stock Adviser as being equally suitable for a farmer keeping a few cows for his own use, and a dairyman with a large number of animals.

The cheapest type of construction will necessarily vary according to the locality and the material at hand, and certain alternative methods of construction are shown on the drawing and will be referred to hereunder.

The aspect of the building will probably depend, to a certain extent, on the site available and the disposition of other existing buildings, but, if possible, it should run north and south, and if it is desired to erect only one half of the building it should open to the west and be sheltered from cold winds as much as possible by trees or other buildings.



**Foundation and Walls.**—Unless good building stone is available, these should be built in brickwork, the best and hardest bricks being selected for the foundations. These should be in 14 inch work and carried down until a good firm footing is reached. In most parts of the country a depth of from 18 inches to 2 feet is sufficient, but if there is any doubt about the solidity of the ground at this depth, they should be carried down further, or if this is found by trial to be useless, two or three courses of 18 inch brickwork should be laid at the bottom of the trench to give the walls a bigger bearing surface.

In naturally damp soils it is advisable to lay the foundation in cement mortar (1 part cement to 4 parts sand), but otherwise lime mortar in the proportions of 1 of lime to 3 or 4 of sand may be used, but under no circumstances is the use of dagga recommended.

If good building stone is easily obtainable, no better material can be used; the stones must be laid on their natural "bed" or with their laminations horizontal, and any that show signs of cracks must be discarded.

The remarks regarding mortar for brick foundations apply equally to masonry.

The foundations should be carried up to a height of at least 9 inches above the ground level and finished off perfectly level.

A damp course consisting of bituminous felt or 26 G. galvanised iron is laid on the foundations. If iron is used, the strips must overlap each other by about 6 inches and be soldered together.

The foundations having been completed, the walls may be proceeded with. These are in 9 inch brickwork, with the exception of the end wings, which should be finished with 14 inch buttresses, to give them additional stiffness and provide a better support for the plate carrying the upper end of the roof.

The walls should preferably be laid in lime mortar, a mixture of 1 part lime to 4 or 5 parts sand being used. If good dagga is obtainable, it may be made use of, in which case the outer surfaces should be pointed and plastered with lime mortar to which a small amount of cement has been

added. A mixture of 1 part lime,  $\frac{1}{2}$  part cement, to 5 parts of sand should be found satisfactory, but if this plaster shows any signs of cracking on drying out, more sand must be added.

Even where lime mortar has been used for laying the bricks, the plastering of the exposed walls is advocated, as it preserves the brickwork and enhances the appearance of the building.

The inside of the walls should be plastered up to a height of 4 feet with a cement plaster of the following composition: 1 part cement,  $\frac{1}{2}$  part lime and 4 parts sand. This mixture is practically impervious to moisture, and can be washed down frequently without damage.

The upper portion of the walls should be plastered with the same mixture as given for the external plastering, but here the cement may be omitted.

The pillars supporting the roof are 14 inches square, resting on foundations 18 inches square, and should be built and plastered as prescribed for the walls.

If the walls are built in masonry they should be approximately 30 per cent. thicker than in brick; the external and internal plastering may be dispensed with, but in this event the joints should be carefully raked out to a depth of about 1 inch and pointed with 1 : 4 cement plaster; this is particularly important on the inside.

**Floor, Manure Channels and Manger.**—In this Colony one's choice of a suitable flooring is somewhat limited. Ordinary bricks are too soft and absorbent; good, hard blue bricks well grouted in with cement mortar make a fair job, but they have a tendency to wear unevenly and thus develop depressions in which moisture can collect—a very undesirable fault.

Good, hard building stone, if carefully dressed, evenly laid, and well grouted with a cement mixture of 1 part cement to 3 parts sand, makes an excellent job, but the dressing and laying of the stones is sometimes a more lengthy and expensive operation than at first appears.

A good concrete floor is probably the most satisfactory all round if properly laid; it is impervious to moisture, is



wear-resistant, and is easily kept clean. The surface can be sufficiently roughened just before it finally sets to prevent its being too slippery.

The mixture of concrete used should be 1 part cement, 3 parts sand and 6 parts stone. If the aggregate is well graded, a sufficiently even surface can probably be obtained with this mixture if the final ramming is carried out with a rammer having a fairly large flat surface. Otherwise this mixture must be topped with a 1 inch layer of granolithic, a mixture of 1 part cement, 2 parts sand, 4 parts stone chips, the largest of which should pass a  $\frac{3}{4}$  inch ring. This layer must be applied while the concrete is still quite green, so that a perfect bond between the two mixtures is obtained.

The total thickness of such a floor should be not less than 4 inches, and this must be laid on a bed of well-rammed hard core (gravel or broken stone) about 6 inches thick. The floor should have a fall of about 1 inch from the manger to the edge of the drain, and the central passage should be slightly cambered.

The concrete should be laid in sections not exceeding 10 feet in length, each section being separated from its neighbour by a strip of bituminous felt or mastic cement, to allow the concrete to expand and contract without cracking. These joints should extend right through the manure channels, which should preferably be cast first in the same mixture as the floor, but which must be floated on the inside with a mixture of 1 part cement to 3 parts sand, and brought to a good, smooth surface. These channels should have a fall of about 1 inch in 15 feet towards their outlet, but in buildings of considerable length a flatter grade will have to be made as it is undesirable for the maximum depth to exceed 6 inches.

All the sand used with cement for concrete and plaster should be clean, sharp river sand, and all cement mixtures should be made in small quantities, so that they can be placed in position within 30 minutes from the time that water is first added to the mixture. After placing, the concrete should be kept damp with wet sacks or grass for at least seven days or longer if possible. If such a floor is allowed

to dry out immediately, it will wear badly and become "dusty."

The manger may be cast either in concrete 1 : 3 : 6 and finished in the same way as the manure channel, or it may be built in brick and finished to the form shown in the drawing with a cement plaster of 1 part cement, 4 parts sand and  $\frac{1}{2}$  part lime, brought to a smooth, even surface.

It is important to note that the front edge of the manger should not be higher than 9 inches above the floor, so that the cows can lie down without stepping back into the manure channel; the bottom of the manger should be approximately at the same level as the floor.

For further details regarding the mixing and placing of concrete, the reader is referred to the article "Concrete on the Farm," which appeared in the *Rhodesia Agricultural Journal* for April, 1926, and subsequently reprinted as Bulletin No. 588.

**Stall Division.**—The stall division may consist of veld poles bolted to short lengths of 3 inch pipe, or light rails driven at least 2 feet into the ground before the floor is laid. Unless the ground is very hard, a small depression should be excavated round them to a depth of about 6 inches, so that they are secured by the concrete floor. If metal uprights are unobtainable, straight poles may be used, but these must not be embedded in the concrete, but let in to slightly tapered holes about 6 inches deep previously cast in the floor, and secured at the top end to the roof rafters, which will be immediately overhead, with  $\frac{1}{2}$  inch bolts. This latter method has three distinct advantages, *i.e.*, it is cheap, the poles can be easily removed and replaced, and they help to support the roof.

The top cross rail should be 4 feet from the ground.

Tethering posts consisting of iron piping or light rails may be secured in the floor in the same way as suggested for the supports of the stall divisions, near the front ones of which they are placed, or small slides made of  $\frac{1}{2}$  inch diameter round iron, approximately 30 inches long, may be bolted to the front uprights of the stall divisions themselves. These slides should be bent and flattened at their ends in such a



way that when they are secured to the uprights, by bolts passing through the flattened ends, they project about 2 inches and run parallel thereto.

**Roof.**—The roof is carried by a main bearer or plate consisting of a  $4\frac{1}{2}$  inch by 3 inch deal or a straight gum or veld pole supported on the pillars and end buttresses.

This bearer, to which the  $4\frac{1}{2}$  inch by  $1\frac{1}{2}$  inch rafters are secured, must be anchored to the pillars and end walls by means of stout hoop-iron built into the top six courses of brickwork. The wall plate on top of the side wall to which the lower ends of the rafters are secured must be anchored in the same way, and it is as well, while building the walls, to place the hoop-iron immediately below the points where the rafters will come, so that it can be nailed direct on to them and thus make the roof more secure.

Rafters are placed immediately over, and midway between, the pillars, and are therefore 3 inches to 9 inches apart.

The roof is made up of lengths of 8 feet and 7 feet iron, and these are secured to five purlins set on their edges, running across the rafters at right angles as shown in the drawing.

The iron is allowed to project well over the central passage to afford as much shade as possible.

**Quantities of Materials and Costs.**—For the general guidance of readers a schedule of quantities of the various materials required is given, together with the approximate Salisbury prices.

Farm-made bricks are quoted at 12s. 6d. per 1,000, and a small cartage charge only is allowed for the stone and sand.

The total cost of the building can only be very roughly estimated, since, as before remarked, the costs of labour and the different methods of construction vary considerably according to local conditions, but the sum of £100 can be taken as a fair average.

## COW BYRE—TYPE II.

*Schedule of Quantities of Materials.*

Item	Number or quantity	Des- cription	Cost	Alternative		
				Number or quantity	Des- cription	Cost
			£ s. d.			£ s. d.
Foundations ...	4,000	Bricks	2 10 0			
Walls ...	12,000	"	7 10 0			
Pillars ...	2,000	"	1 5 0			
Manger ...	700	"	0 9 0			
	2 bags	Lime	0 13 0			
	2 cu. yds	Sand	0 4 0			
	4 bags	Cement	2 16 0			
„ concrete	...	...	...	9 bags	Cement	6 6 0
				2 cu. yds	Sand	0 4 0
				4 cu. yds	"	0 16 0
Mortar ...	25 bags	Lime	8 2 0	8 bags	...	2 12 0
	11 cu. yds	Sand	1 2 0	3 cu. yds	...	0 6 0
					Dagga	
Manure channels	5 bags	Cement	3 10 0			
	1½ cu. yds	Sand	0 3 0			
	2½ cu. yds	Stone	0 10 0			
Concrete floor ...	22 bags	Cement	15 8 0			
	5 cu. yds	Sand	0 10 0			
	10 cu. yds	Stone	2 0 0			
Stone floor ...	...	...	...	14 cu. yds	Stone	1 8 0
				12 bags	Cement	8 8 0
				3 cu. yds	Sand	0 6 0
Damp course ...	10 sheets	26 G. gal. flat iron	2 3 0	1 roll	Felt, 3-ply	2 5 0
Corrugated iron ...	44 sheets	8 ft. x 24 G.	10 18 0			
	44 sheets	7 ft. x 24 G.	9 12 0			
Hoop iron ...	30 lbs	...	0 10 0			
Screws, bolts, nails, etc.	...	...	3 0 0			

Item	Section	Length	Number	Cost
		Feet		£ s. d.
Wall plates ...	4½ in by 1½ in	12	4	0 12 6
	do	15	2	0 7 10
Beam, supporting roof	4½ in by 3 in	8	2	0 9 0
above pillars	do	15	4	1 13 9
Rafters ...	4½ in by 1½ in	13	18	3 0 0
Purlins ...	3 in by 2 in	16	20	4 0 0
	do	8	10	1 0 0
Fascia boards ...	6 in by 1 in	13	4	0 12 6
Stall divisions, uprights—				
Bush poles ...	3 in butts	11	8	...
	do	10	8	...
Alternative: Old 3-in. pipe	...	6	16	...
or rails				
Horizontal rails — Bush	3 in butts	7	24	...
poles				



## Bee-Keeping in Rhodesia.

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### STRAINING, BOTTLING AND MARKETING OF HONEY.

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By T. SAVORY.

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Having dealt with the extraction and final ripening of the honey crop in the last issue of this Journal, it now remains to treat with the above-mentioned details.

For those who do not possess an extracting machine the process of straining the honey from the comb is a simple one, but most extravagant in material, inasmuch as it means the complete destruction of the drawn out combs. For each pound weight of the wax, the bees use some 12 to 14 pounds of honey in the making, to say nothing of all the time lost by the bees in making and drawing out fresh cells and comb. In a well cleaned petrol tin place the comb for straining on a layer of cheese cloth, covering the top of the tin with either another cloth or a pane of glass. An hour or so of ordinary Rhodesian sun will open out and melt every cell, leaving the honey below and the wax on top. If a tap has been fitted into the petrol tin all the better, in which case open the tap on to a second tin to strain into, when the result should be almost as clear as extracted honey. On no occasion use fire heat for extracting from these combs, for, as already stated, fire can easily overheat the honey and so spoil its delicate aroma and taste.

With the ripening instructions given in the last issue, the crop is now ready for its final treatment of bottling. This can be done in containers, tins or screw-topped glass bottles, as fancy may dictate, generally used in one pound weights. Of the three methods the glass bottle is decidedly the nicest looking way of offering honey for sale, but the cost of the bottle

at a distance of just 2,000 miles from the coast ports adds at least sixpence per pound to the cost of the honey. The container, which is made of papier-mache, and is very strong and serviceable, is by far the most reasonable in price, and should not cost more than twopence each on the farm. The contents, however, cannot be seen by the purchaser, so that the actual receptacle must be decided as each thinks best—the bottles are certainly the most popular. Whichever is chosen, see that each bottle, can, etc., is perfectly clean and dry before using; then, with the finally strained honey in a tin with a tap on the lower end, carefully fill each package with its pound of honey (so as to avoid all possible air bubbles), and at once cover it with a lid. It is a very good plan when all is bottled to put them in a place where the warm rays of the sun can get to them; this tends to reduce any bubbles that may have gathered and also helps to give the honey a clear and bright appearance and colour. A neat label, with name, etc., as desired, should then be fixed on and each bottle nicely polished, when all will be ready for the final action of selling the product.

The price to be asked per pound package must, of course, be left to the judgment of the producer; honey up to the present has by reason of the price asked been considered as an article of luxury, and is often priced at the retail stores at as much as 3s. 6d. per pound. This most certainly should not be, and the writer is of the opinion that if 2s. to 2s. 6d. per pound is asked by the producer it is a good return for the investment and work, and at that price he should be able to rebate a liberal discount to the trade who may purchase it for resale, and in bulk an equally good return would be obtained at the price of 1s. 6d. per pound. Honey in a country like South or South Central Africa has no right whatever to be considered as a luxury, but as an every-day article of pure food obtainable at a price equal to or lower than the ordinary jams or other manufactured sweets.

Before leaving this subject, a few words on granulation may be said. Nearly all honey at the approach of cooler or cold weather will granulate unless previously treated to prevent it, and although many think that granulated honey is not pure, as a matter of actual science the very fact that it granulates is one of the best proofs of its



purity. There is no plan known that will act as an actual preventive, though by treatment it may be considerably delayed. This is done by heating the honey in bulk before bottling, by the immersion of the main can in a larger can of warm water, which should be brought up to a temperature of 150 degs. F. If the temperature is over this, there is a danger of impairing its delicate flavour as well as its colour. This is without doubt the best way, as warm honey flows more freely and can be handled more rapidly, while any air bubbles there may be tend to rise more quickly when it is warm. Should, however, the producer find his honey granulated in bulk it can be brought to its liquid state by putting it into a double boiler and gradually raising the temperature to 150 degs. F., keeping it at this until it is all melted and then replacing it, covering and sealing it when warm. But do not raise the temperature too quickly.

Many progressive bee-keepers make a point of adding a note on their labels somewhat as follows:—"This honey will granulate in time, and the fact of its granulation is absolute proof of its purity; if preferred liquid, put it into a pail and the pail into warm water."

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## Extracts from the Report of the Director of Veterinary Research for the Year 1927.

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**Quarter Evil Vaccine.**—Over seventy thousand doses of what has come to be known as the "Rhodesia Quarter Evil Vaccine" has been issued during the year. Until a few years ago this disease was enzootic, but recently it has become epizootic, and exists in most parts of the country among European and native-owned cattle. An interesting and exceptional feature of the disease as it occurs in this country is that when it first appears in an area even very old animals and also very young ones die. The cause of the disease is a bacillus producing very resistant spores which

are present in the lesions in vast numbers. These, being distributed from sick and dead animals, contaminate the soil, which remains infected for very long periods. The question is sometimes asked whether the vaccine gives rise to life-long immunity in the inoculated animal. A definite answer cannot be given; all that can be claimed is that it probably gives as long an immunity as any other protective inoculation against quarter evil. In practice it has been found that it is rarely necessary to re-inoculate animals once treated. But it is hardly likely that the immunity is life-long; its continuance probably depends upon the degree of re-infection during the protected period, resulting in the resistance becoming re-inforced. Another explanation has been offered that animals grow out of the susceptible age, but in this country there does not appear to be any particular age limit. Possibly under the climatic conditions of this country, where for long periods of the year the veld is exposed to intense sunshine and desiccation, soil infection does not persist as long as in most temperate climates. The "Rhodesian" vaccine has largely supplanted all other anti-quarter-evil vaccines hitherto in use in this country, chiefly by reason of its efficacy, cheapness and other advantages. Its keeping qualities, the manner in which it is dispensed, and the size of the dose, are all features which attract the practical stockman. The fact that twenty thousand more doses have been issued this year than last indicates its efficacy; and once again it can be recorded that only one complaint concerning it has been received during the past year. In view of the criticism to which such products are commonly subjected, especially by those hoping to obtain a refund, the absence of complaints is a testimony of its worth. It may be remembered that the establishment of this laboratory largely resulted from a public and urgent demand for a quarter-evil vaccine in sufficient quantities to meet local requirements. It is satisfactory to be able to report that this demand has been fulfilled.

**Infectious Abortion Vaccine.**—The issue of the so-called "de-vitalised vaccine" has been less than in 1926. This is largely due to the fact that there is no longer any obligation upon the owners of infected herds to eradicate the disease. The low value of cattle and the view that infection "wears



itself out'' have dissuaded stock owners from incurring any expense in the attempt to eliminate the disease. Not a few owners of herds in which the disease existed some years ago, and from which it was thought to have died out, have recently sought advice, a recrudescence having occurred. It is not generally understood that the "carrier" cow is the chief source of danger and the means whereby infection is perpetuated, for while she may appear to be healthy and may even give birth to a healthy calf, her foetal membranes may actually be teeming with the causal bacteria of the disease, and these, having been taken up by a pregnant susceptible animal in the food or water or by other means, may infect that animal and originate what appears to be a new outbreak. The advice given in my annual report for the year 1924 may be repeated:—"In the light of our present knowledge, it would appear that the best way of dealing with an outbreak of infectious abortion is to seek out and eliminate the source of infection, to disinfect cow sheds, kraals and infected watering places, to get rid of non-breeding cows and those constantly returning to the bull, to test all bulls and remove re-actors, and to vaccinate all females in danger of becoming infected. The culling of all non-breeding females may appear a serious matter, and too drastic a course to be adopted in practice; but it should be remembered that any one of them may be the cause of the continuance of the disease and its re-appearance after every effort has been made to eradicate it. In view of the prospect of a market for cattle offered by the recent cold storage agreement, the sale of females, many of which are in first-class slaughter condition, should not entail the loss which at first sight appears inevitable. The policy of the elimination of barren females and possible carriers is therefore of the greatest importance, and it should include any animal which, having had the opportunity of becoming pregnant, has failed to produce a calf. This policy should be continued over a series of years. In the meantime the protection of susceptible in-contacts by vaccination should be carried out systematically. If by reason of the large numbers of females involved it is impossible, it should be applied to the heifer herds, say, two months before the bulls are run with them, and at intervals of three months, in order that the immunity may be carried on throughout the whole period of pregnancy. Those which

fail to conceive should be disposed of as suggested." The writer regards infectious bovine abortion as a very serious menace to the cattle industry and a possible source of danger to human health. Stockmen have shown him figures covering a number of years during which the calf-crop has fluctuated from 25 to 75 per centum per annum, the low birth-rate being chiefly due to abortion and sterility. An average over ten years would not exceed 45 per centum. It is doubtful whether under such conditions ranching can be made to pay, and it is certain that dairying and the breeding of more valuable animals cannot be profitably undertaken.

**Redwater and Gall-sickness Vaccine.**—It is pleasing to report that the difficulty in connection with this vaccine has been overcome, and that a virus-vaccine suitable for the inoculation of young animals on the farm, and older animals at the Veterinary Research Station, is again available. The price of the vaccine is 1s. per dose. The injection has to be made within forty-eight hours after the despatch of the vaccine from the laboratory. This time limit constitutes a handicap to Matabeleland stock owners, and animals are now being prepared as "bleeders" or "reservoir" animals, which can be kept under suitable supervision at Bulawayo and other centres from which the vaccine can be issued, thus avoiding the delay.

**Horse-sickness Vaccine.**—This is also a so-called virus-vaccine, and in that respect differs from the simultaneous virus-serum method of inoculation practised elsewhere. Although the vaccine prepared for issue this year was probably the most satisfactory ever produced, the demand was less than hitherto. This is no doubt due to the fact that motor transport has almost entirely replaced the horse and mule. The vaccine has proved so satisfactory in practice and so easy of application that it is now issued for the owner himself to apply to his animals. The efficacy of the method is shown by the following figures supplied by the Staff Officer of the British South Africa Police:—



Number of inoculated Police horses on the strength on 1st January, 1927 ... ..	287
Number of deaths from horse-sickness among inoculated horses during the year 1927 ... ..	5 or 1.74%
Number of un-inoculated horses on the strength on 1st January, 1927	10
Number of deaths from horse- sickness among un-inoculated horses during the year 1927 ...	2 or 20%
Number of remounts inoculated during the year 1927 ... ..	29
Number of deaths during inoculation	1 or 3.4%

It may be pointed out that the 297 horses were distributed throughout the country, and were exposed to natural infection at all times of the year. Their patrols were at no time restricted for fear of infection, as in those days before the introduction of the inoculation process, and no special care was taken of the animals except the taking of morning and evening temperatures and the suspension of work when an elevation was noticed. The success of this method of inoculation is shown by the fact that the British South Africa Police is now a mounted force throughout the whole year, whereas in the days before this inoculation was available, for several months during the horse-sickness season patrols had to be performed on mules, donkeys or on foot. The value of the method also to the public is shown by the following extract from a letter applying for vaccine:—“During the past few years I have inoculated eighteen horses with your vaccine, and sixteen are alive to-day. As these horses, mostly brood mares, run night and day on my farm, I consider the immunity conferred wonderful.” This relates to a farm in the Gwanda district notoriously bad for horse-sickness. The Cattle Inspector, Macheke, in his annual report says:—“As regards horses which have been inoculated during the past two years with vaccine prepared by the Director of Veterinary Research, these have, as far as I have been able to trace them, shown great resistance against attacks of horse-sickness—the general opinion of horse owners is that Mr. Bevan’s vaccine is most beneficial.” In view of the labour, anxiety and official difficulties which the discovery

and elaboration of this method entailed, it is somewhat disappointing that, success having been achieved and a satisfactory vaccine having been evolved, there is little or no demand for it. It is possible, however, that the horse may again "come into its own" in this as in other countries where its usefulness is again becoming recognised.

**Redwater and Gall-sickness.**—The recovery of a virus-vaccine for the inoculation of cattle born and reared on areas rendered tick-free by systematic dipping, and of well-bred animals imported for the improvement of our local stock, was considered of primary importance, and every effort was concentrated on this particular line of research. The need for such a virus-vaccine is well explained in the following extracts from a letter received from a leading stock breeder:—"I understand that the vaccine, against redwater and gall-sickness, is not available at present. Its use has been of inestimable value to the cattle industry, and has been the means of saving a large proportion of the annual crop of calves. These in turn have been sold, and the proceeds circulated to the general benefit of the community. Buyers have become so accustomed to the benefits of inoculation that unless they can procure these protected animals in Rhodesia they will be compelled to purchase elsewhere. This is a double loss to the country. First, in the large number of unprotected animals which die and which really cannot be spared for grading up the herds, and again in the capital loss entailed. It is very disheartening to buyers to find their much-needed money gone, and only a carcase left to represent it. It has to be admitted that breeders who have systematically dipped their stock for many years, and who have consequently eliminated the blue tick materially, are now producing an animal highly susceptible to infection on raw veld. This is penalising the law abider. The vaccine met this case thoroughly. Personally, I have only known of one inoculated animal die of gall-sickness, and that was a weakly calf which was experimented on. I hope the absence of vaccine is only temporary. It is a serious matter for the cattle and farming industry and also for the breeders. If buyers from Rhodesia, the Congo and Portuguese East Africa are forced to leave this market, the money goes out of the country." Since this letter was written the intensive dipping campaign throughout the country has rendered still



further areas free from ticks, and cattle bred upon such areas will be susceptible to tick-borne disease when exposed on tick-infested country which still exists and must for a considerable time continue to do so. The improvement in the market value of cattle has again awakened an interest in them, and has renewed the desire to improve the quality of our beef and dairy herds. Such improvement can only be effected by the importation of well-bred bulls and cows, and in most parts of the country, animals thus introduced should be protected by inoculation against natural infection with the various diseases which ticks transmit. To emphasise the danger of the movement of susceptible animals, the following incident may be mentioned. Six pure-bred bulls, bred by a farmer in the Salisbury district, whose farm as the result of careful dipping since 1910 is free from ticks, were sent on 26th May to the laboratory for inoculation. They left the farm and travelled by public road to the nearest railway siding, about five miles distant. They were detained at the siding until the arrival of the train and until trucks could be prepared for them. They were then consigned direct to the inoculation station and were off-loaded at the research station, which is tick-free. They were taken direct to special stables, bedded on sawdust and fed upon tick-free foods. On 27th June engorged blue ticks (*M. decoloratus*) were found on three of them. It is probable that these ticks were picked up at the siding, for although the usual period of engorgement for the blue tick is 21 days, it is possible that some delay was caused by the exceptionally cold weather prevailing at the time. On 30th June piroplasms were found in the blood of two of the bulls, and a third animal had a high temperature. On 2nd July one of the bulls, and later, two others, revealed spirochætes in their blood. Subsequently, three of the bulls developed an acute anaplasmosis. It is fortunate that the infection took place *en route* to the inoculation station, where daily observation led to its early discovery, and where appropriate treatment could be applied, rather than in animals on their way to the farm, where the disease might not have been detected until the death of the animals from redwater, and after infective ticks had been disseminated among susceptible and valuable cattle. This incident serves to demonstrate the danger in moving susceptible animals for even short distances over tick-infested veld, and the need for a method of pro-

tecting such animals before exposure. Now that a suitable virus-vaccine is again available, the owners of cattle reared on tick-free farms are recommended to inoculate their calves "at heel," and intending importers of valuable animals from overseas should first consult this Department and make the necessary arrangements for their inoculation at the Veterinary Research Station or some other suitable place. Moving uninoculated animals from rail over public thoroughfares for even short distances to clean farms has in the past, on more than one occasion, proved disastrous.

**East Coast Fever.**—It would appear from the reports of the Chief Veterinary Surgeon that the campaign against East Coast fever may in the near future eliminate this disease from this country, provided, of course, that the infection cannot remain latent in recovered animals, and that ticks cannot survive and remain infective for a longer period than is generally believed. Until the country has been free from the disease for a very considerable time, it would not be wise to overlook the necessity for further research into many of the problems which it presents. Among these the following require investigation:—

1. The life-cycle of the causal parasite, including the question as to whether parthenogenesis occurs; whether there is a latent form of the parasite; and whether Koch's bodies are diagnostic of East Coast fever or occur in other diseases. Attempts should be made to discover a method of diagnosis as an alternative to microscopic examination of specimens.
2. Whether the salted ox becomes a "carrier" of the disease, and whether such an ox becomes immune, and if so, for how long.
3. Whether the immersion of the animal at certain intervals in solutions of arsenic affects the development of the parasite.
4. Whether game are susceptible to, and become reservoirs of, infection.
5. The life-cycle of the tick and the maximum period of survival.



6. The development of the causal parasite in the tick, and whether it passes through the egg of an infected tick to succeeding generations.
7. Methods of protecting animals against infection other than by perpetuating the disease.
8. The discovery of a dip non-poisonous to cattle but destructive to ticks.
9. Methods of treating the disease.

It is fortunate that many of these problems are being investigated in well-equipped and adequately staffed laboratories elsewhere, and in countries which present greater facilities for certain lines of investigation than obtain in this country. For example, in the Kenya Colony, where the disease is present not only in epizootic but enzootic form, the questions relating to the salted animal are being enquired into under conditions much more favourable for the work than could be obtained in this country. Some of the problems enumerated are being actively dealt with at Onderstepoort, the Pasteur Institute, Algiers, and even in European laboratories. It is not suggested, however, that research in this disease should be neglected in this country. In the past it has been difficult, for many reasons, chiefly associated with the danger of disseminating and perpetuating infection. These difficulties to a large extent still obtain, but there are certain aspects of the disease which are being investigated here. For example, in August last the Chief Veterinary Surgeon caused to be collected and forwarded to the laboratory, in a sealed truck, twelve animals said to have suffered severely from East Coast fever during the recent acute outbreak in Matabeleland. The animals were from the highly infected veld on the southern border of the Essexvale Estate, and were portion of the balance of twenty-two animals which had survived out of three hundred head. They had been sent to the sick camp either visibly sick, on temperature, or smear examination. They were all known to the Cattle Inspector in charge, and had been branded. They had been infected during the period between November, 1926, and February, 1927. From June, 1926, until the end of March, 1927, these animals had been dipped at five-day intervals in 0.16% arsenious oxide, and from April, 1927, had been dipped at three and four-day intervals in 0.1% arsenious

oxide. On arrival in the research camp they were immediately dipped and passed to an isolation camp, where they have remained under most careful observation. They have been temperatured daily, and on any elevation or irregularity, gland and blood smears have been submitted to careful microscopic examination with a view to ascertaining whether in any circumstances immunity breaks down and latent parasites undergo development and invade the peripheral blood, thus becoming available to ticks feeding at the time. These animals have been submitted to very adverse conditions, extreme heat, exposure to continuous rains, shortage of food, injection of harmful drugs, and other conditions conducive to a break down of immunity. One ox is extremely old; his age cannot be computed; three cows were found to be suffering from infectious abortion, one of which aborted; two others gave birth to unhealthy calves which soon died, the mothers retaining their foetal membranes; five others gave birth to healthy calves. None of these animals has at any time shown any indication of "break down," and no Koch's bodies or *Theileria parva* have ever been found in gland or blood smears. The organs of the first cow which was destroyed were carefully searched, and no indication of a latent infection could be found in them. It is realised, however, that a negative proves nothing; all that can be done is to keep the animals under continued careful observation in the hope of detecting a recurrence should it occur. Such a discovery would be of the utmost importance. A strain of the disease was established last year at the laboratory with ticks kindly supplied by the Chief Veterinary Research Officer, Kenya Colony, and this was continued for a few generations by inoculation with gland substance. Some interesting facts were observed, but these could not be followed up, as the strain died out. Three further supplies of ticks have again been sent by Mr. Walker, who collected larvæ from known infected animals. Unfortunately, the nymphs failed to infect. It is suggested that temperature conditions may have been the cause of this failure, although the ticks were applied at different times of the year; some in the cold season and others during the warm weather. It may cause surprise that infected ticks had to be obtained from Kenya Colony, but although Mr. Lawrence spent some weeks on the infected area in Matabeleland with the object



of collecting ticks, and officers of the Veterinary Department collected and forwarded a few from sick animals, most of the specimens received had been harmfully affected by the arsenic in the dips; very few lived more than a few days, and none proved infective. In these circumstances, the experiments which it was hoped to carry out were impossible. This proves the contention that such investigations might be more satisfactorily performed in a country where climatic conditions, tick-life, and the distribution of the disease are more favourable for research; but collaboration and inter-communication between the various workers dealing with these problems in different parts of the world is very desirable.

**Trypanosomiasis.**—It is probable that with the elimination of the tsetse fly the disease known as trypanosomiasis will disappear, but until this has been accomplished it becomes necessary to devise methods of enabling man and animals to live in fly-infected areas. To this end certain experiments have been carried out during the past year, preference being given to those which appeared to be of the greatest practical importance. It is well known that in tsetse fly areas game can become infected with various species of trypanosomes, but remain apparently unharmed by them. Their blood, however, is infective to susceptible animals, which indicates that they are not cured of the disease, but become “carriers” of infection. A form of immunity known as “tolerance,” a condition in which a balance is established between host and parasite, is set up. The manner in which this condition is produced is unknown, but is well worthy of investigation.

It was thought that if the natural process could be imitated, or if by artificial means a similar condition could be set up in domestic animals rendering them resistant to re-infection, large areas of valuable country might be opened up to agriculture or mineral development and profitable settlement. It has been observed that the tsetse fly recedes before settlement; such a discovery, therefore, would serve a dual purpose. In 1909 a method of treatment was introduced by the writer which has been extensively tested since, and has proved remarkably successful. It was found that not only did a very large proportion of infected animals recover, but that many of such animals subsequently resisted re-infection, natural or artificial. This was proved by sending treated

animals, together with controls, into areas densely infested with fly. The latter died, while the treated animals lived. These results suggested the possibility of bringing about in cattle a condition similar to that naturally set up in game, and experiments have been carried out to devise a method based upon scientific principles. These experiments have proved very successful, and the results have been achieved more rapidly than was anticipated. Already an enthusiast has presented a span of oxen to be treated, and these with controls will be exposed to natural infection. The method, however, is not yet perfected, and considerable further research is necessary. In the meantime, assistance has been given to those whose cattle have become naturally infected, and a routine method of treating such herds has been recommended and applied with considerable success.

Experiments have been continued to ascertain the influence of dipping upon the course of the disease in cattle. It has been difficult to arrive at very definite conclusions, because the number of trypanosomes present at any time in the peripheral blood of infected cattle is not great, and fluctuations in the number occur naturally from day to day. The disappearance of parasites, therefore, cannot always be attributed to the dipping. One definite observation has been made, namely, that weekly dipping in weekly strength of arsenic-containing solutions exerts no beneficial influence on the course of the disease. Indeed, in cold or windy weather the immersion appears to be actually harmful to infected animals. In those places where weekly dipping was practised, owners have been advised to resort to short-interval dipping, the absorption and retention of arsenic appearing to counteract any harmful effects and to act as a tonic, apart from any influence it may exert on the parasites. Another good purpose it serves is the destruction of ticks, which on some of the areas have been extremely numerous. It has been found, as the result of close observation and systematic examination of blood smears, that cattle naturally infected with trypanosomiasis are liable to suffer from recurrences of piroplasmiasis, the double infection constituting a very severe strain on the animal. It is probable that on farms where the cattle are infected with trypanosomiasis, and where frequent re-infection with piroplasmiasis as the result of



gross tick infestation occurs, the heavy mortality and the failure to respond to antimony treatment may be attributed as much to the latter as to the former disease. In addition, during the winter months the loss of condition due to trypanosomiasis is often increased by the shortage of grazing, and owners have been recommended to provide an adequate supply of hay, ensilage or other food to carry their cattle through the dry period. Other experiments have been carried out with a view to finding a method of treatment more simple of application than the intravenous inoculation of antimony. Innumerable preparations and combinations of drugs have been tested, but even now the results are not entirely satisfactory. The proper "timing" of treatment has also been investigated, this having an important bearing upon the inoculation process previously referred to.

**Sheep Diseases.**— It has not been possible to devote much time during the past year to the investigation of the diseases of sheep, but experiments with a view to discovering a method of eliminating the so-called "nodular worm," (*Esophagostomum columbianum*, have been continued. The chief difficulty in finding such a treatment arises through the fact that this worm is situated in the large bowel, and that any vermicide to reach it has to pass through the rumen, reticulum, omasum and abomasum, where it is diluted in some thirty pints of ingesta and is acted upon by the various processes of digestion, and afterwards has to pass through about eighty feet of small intestine before arriving at the position in which it is expected to exert its destructive influence upon the worms. Several drugs are known which will destroy the worms and their larvæ almost instantaneously *in vitro*, but are so profoundly altered in the sheep's stomach that they are rendered inert by the time they reach the cæcum and colon. Tobacco has been recommended as a remedy, and was expected to destroy the worms in two ways: first, by escaping complete digestion in the stomach and retaining its nicotine until arrival in the large bowel, and, secondly, by daily administration as a lick, killing larvæ arriving in the stomach, and so preventing the worms from reaching the intestines. A sheep which had received a supply of salt, bone meal and tobacco daily for over a year was sent to the laboratory, and on *post-mortem* examination was found to

be grossly infested with œsophagostomes, its intestines being thickly studded with the characteristic nodules. As most sheep in this country are infected with "nodular worm disease," it is difficult to decide whether the unthrifty condition and sometimes heavy mortality which frequently occurs in flocks of any number is due solely to this cause or to other diseases, such as those due to deficiencies, associated with it. Apart from the discovery of specific remedies for specific diseases of sheep, it becomes necessary to find a more suitable system of dealing with them than the haphazard methods obtaining in the past. The proper "organisation of pastures" will largely remove many of the ailments which now reduce our flocks. Fencing, a constant supply of pure water, shelter from cold and rain, and an adequate food supply during the summer and winter, will probably prove more conducive to health than all the drugs in the Pharmacopœia.

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## Diseases of Tobacco in Rhodesia.

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[The following extract is taken from the annual report of the Mycologist for the year 1927.—Ed., R.A.J.]

The principal diseases affecting this crop in Rhodesia were white mould (*Oidium* sp.), angular spot (*Bacterium angulatum*), wildfire (*Bacterium tabacum*), frog eye (*Cercospora nicotianæ*), mosaic and nematode (*Heterodera radicicola*), of which the most destructive was the white mould. The dry climatic conditions prevailing during the early part of the year were unfavourable for the development of bacterial leaf spots, so that the depredations of wildfire and angular spot were markedly reduced. Their distribution was, however, widespread. White mould made its appearance early in the season, and was particularly severe in most parts of the country, due to the rapid spread of disease as



a result of copious spore production induced by dry conditions. It was noticed that infected leaves became a pale yellowish-cream colour prior to the formation of spores, and it was found that good control of the disease could be obtained by the removal and destruction of those leaves immediately the symptoms appeared.

Loss from frog eye disease was insignificant, only one case of extensive damage being noted in a field of late planted tobacco on medium-heavy red loam.

Much avoidable loss from mosaic resulted from the popular conception amongst growers that the disease was non-infectious. Instances were observed of its dissemination throughout an entire crop during the operations of priming and cultivating. It was found, however, that more care was taken to keep the disease in check during the beginning of the 1927-28 season, and it appears that the amount of disease has diminished.

Root gall-worm, or nematode, was of general distribution, but few cases of severe infestation were reported; the pest apparently being more prevalent in the sandy soils of Matabeleland than in Mashonaland. It is gratifying to note that farmers are striving to eradicate the pest by introducing crop rotations of two years maize and one year velvet beans.

The 1927-28 season is characterised by the unusual prevalence of wildfire. So far in every case observed original infection has been traced to the seed beds, and investigations are being carried out to test the efficacy of the present system of seed sterilisation.

# The Live Stock Industry of Southern Rhodesia.

The following particulars have been compiled by the Government Statistician :—

## LIVE STOCK OWNED, 1918-1927.

Year.	Total cattle.		Total pure-bred cattle, European only.	Sheep.		Pigs.	
	European.	Native.		European.	Native.	European.	Native.
December, 1918	No. 600,447	No. 610,105	No. 6,286	No. 51,203	No. 319,594	No. 15,248	No. 37,947
" 1919	678,508	652,776	6,610	44,257	327,802	14,585	40,997
" 1920	772,891	744,402	8,468	43,844	307,575	17,761	36,515
" 1921	905,040	845,498	8,748	52,944	278,329	26,672	38,547
" 1922	936,251	864,894	9,254	61,324	255,487	21,505	28,586
" 1923	993,608	927,343	9,950	62,861	262,432	22,441	29,932
" 1924	1,003,629	1,005,277	10,755	71,014	269,049	20,446	29,480
" 1925	1,006,086	1,095,841	10,817	67,904	280,849	20,156	35,347
" 1926	991,216	1,197,466	11,500	66,236	265,458	20,385	35,933
" 1927	954,835	1,370,567	11,761	69,433	282,241	19,981	35,714



## ANIMAL PRODUCTS MARKETED, 1918-1927.

Year.	Butter.		Total butter commercially disposable.	Milk (sold) by farmers.	Cheese (produced).	Eggs (sold).
	Farm (sold).	Creameries (produced).				
December, 1918	Lbs. 209,439	Lbs. (a)	Lbs. (a)	Gallons. 324,093	Lbs. (a)	Dozens. 116,950
" 1919	294,784	(a)	(a)	290,839	44,076	136,407
" 1920	244,761	(a)	(a)	265,519	33,457	144,047
" 1921	255,104	(a)	(a)	435,148	41,854	213,778
" 1922	292,964	282,850	575,814	366,670	39,333	193,347
" 1923	338,343	554,206	892,549	503,111	106,913	249,393
" 1924	425,018	871,714	1,296,732	518,158	151,620	312,495
" 1925	393,539	1,002,850	1,396,389	621,357	130,768	308,158
" 1926	382,443 (b)	1,168,847	1,551,290 (b)	732,170 (b)	153,040	325,225 (b)
" 1927	369,211	1,342,348	1,711,559	827,246	99,368	343,604

(a) No information.

(b) Revised figures.

## Correspondence.

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*[No responsibility is accepted by this Journal for the views expressed by correspondents.]*

The Editor,

*Rhodesia Agricultural Journal.*

Sir,

*Farm Costs and Book-keeping.*

Your correspondent "X X X" is right. Farming costs on a mixed farm are most difficult for most people to work out. Many farmers have not the time, some have not the inclination, but most have not the knowledge. None can afford to keep a clerk. *Labour*, the heaviest cost on a farm, has to be accounted for every hour of the day. This is where organisation comes in. If one has boys jumping about from one work to another, at umpteen different jobs in a day, one need not attempt to keep costs. Otherwise there is no difficulty in apportioning cost of labour. The cost of meal, etc., is somewhat hypothetical, but 5s. a month can be allowed for each boy's skoff. If a boy's cash wages are 15s. a month, add 5s. for skoff and his pay comes to 8d. a day.

A diary has to be kept, a page for each day, with the different works set out on the left side, leaving plenty of space for each. I write these in ink. Then following these I put the boys' names in pencil, with the total of their days' pay in ink opposite the job they were at.

At the end of the week the amounts are added up and put under their own headings. At the end of each month the same.



Example of page of diary at the end of each month:—

				July.	Previously.	Total.
Tobacco (in detail if required)	...	...				
Maize	do.	...	...			
Sunflower	do.	...	...			
Beans, etc.	do.	...	...			
Cows : kraals, byres, hay, feed, etc.		...				
(in detail if required)						
Oxen	do.	...	...			
Pigs	do.	...	...			
Poultry	...	...	...			
Milk (dairy)	...	...	...			
				£	£	£

The foregoing gives cost of *labour* as near as necessary. The most troublesome items to apportion are payments for repairs to implements, an allowance for use of oxen, wagon, etc., and rent. They can be done by proportion, according to acreage and usage. Railages can be posted direct from the cash account to the accounts they belong to, also petty expenses, or the latter can be split up proportionately.

I have kept farm books for years here and elsewhere. In Scotland I was one of the farmers on the Agricultural Costings Committee, keeping account of all my costs for Government use. Its use was very doubtful. No two seasons are alike, no two fields, no two animals, and no two men!

A farmer's profit and loss account can be only hypothetical; it depends so much on the valuation of crop, animals, etc.

There is nothing hypothetical about a bank account and its balance, and for this reason many Home farmers have never kept proper books.

They can tot down in pencil their bank balance at the beginning of the year, their inventory and valuation at the same time. At the end of the year they repeat the performance, and compare the figures. Then they take a note

of accounts due *by* them and payable *to* them. Thus they strike their balance. They know how they stand by their bank balance and the difference between their two valuations, accounts to pay and accounts payable to them.

I do not believe 10 per cent. of them keep proper books to-day—tax or no tax.

Enclosed please find an old cutting from the *Scotsman* showing a simple form of book-keeping for farmers.

I prefer an account book with pages allotted to each item rather than the intricate system of columns, but I do my profit and loss account in the same way as shown.

Hoping the foregoing and enclosure will be of use to you.

Yours truly,

J. F. WILSON.

Wallacedale, Odzi,

11th July, 1928.

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[Our correspondent had apparently written his letter before he received his copy of the July issue of the *Rhodesia Agricultural Journal*, which contains an article by the Acting Accountant of the Agricultural and Veterinary Departments on the keeping of farm accounts. He will probably agree that the allocation of native wages, as described in the article in question, is more satisfactory than the example he gives, as it involves less writing and is at the same time simple and efficient. We have not sufficient space to reproduce the cutting from the *Scotsman*, which embodies a leaflet on the keeping of farm accounts, issued by the Board of Agriculture and Fisheries in 1914. Except for the method of dealing with labour accounts and the omission of a ledger, the system elaborated is very similar to that outlined in the article which appeared in the July Journal. We think that the inclusion of the ledger is well worth the time spent in keeping it posted.—Ed., *R.A.J.*]



## Tobacco.

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### THE OVER-PRODUCTION IN CANADA.

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Washington, D.C., 14th May.—Failure of the farmers in south-western Ontario to realise the anticipated returns from their tobacco in 1927 is mentioned as one cause of an agricultural depression which has extended even into Windsor, the business centre of the district, by American Consul H. F. Hawley in a report released by the Tobacco Section of the Department of Commerce. The culture of tobacco in Canada was undertaken in 1927 on a larger scale than ever before, owing to the preference offered in England on Canadian tobacco as well as an effort on the part of Canadian farmers to utilise areas previously depredated by the European corn-borer.

The Ontario crop is estimated to have contained 35,000,000 pounds of saleable tobacco compared with 20,000,000 pounds in 1926, and nearly 90 per cent. of the production was grown on 29,800 acres in the Windsor Consular District, where conditions and soil are most favourable.

Unfortunately, this large production did not find the demand anticipated, and the farmers, left with large quantities unsold, charged that buyers for the British tobacco manufacturers deliberately refrained from purchasing, or offered prices considerably below the cost of production to depress the market. The buyers, on the other hand, claim that much of the tobacco is of low grade and that they cannot pay the high prices demanded for Canadian leaf and meet the competition encountered in the British market from other Empire-grown tobacco, likewise seeking to enjoy the benefit of the British preference tariff of 2s. 2d. per pound. The farmers' agitation resulted in a demand for the formation of a pool to handle the marketing of all tobacco. Such a pool would supersede the Canadian Tobacco Growers'

Association of Kingsville, which has become involved in financial difficulties.

Incidental to the general discussion of relief measures were the demands for increased duty on American leaf imported into Canada and a decrease in the present internal excise duty on cigarettes and other forms of tobacco manufactured in the Dominion.—(Lamm, *Western Tobacco Journal*.)

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## Movements of New Settlers.

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The following new settlers arrived in the Colony during the month of June, 1928:—

Messrs. McFarlane and McIntyre.—Arrived from Great Britain on 1st June, seeking farm employment.

H. North.—Arrived from the Union on 1st June and is undergoing a period of training on Ruia Ranch, Darwin.

P. Chadwick.—Arrived from Great Britain on 1st June and proceeded for farm training to Mr. A. Frazer Mackenzie, Lone Cow Estate, Banket.

H. H. D. Jonas.—Arrived from Great Britain on 3rd June and joined Major J. Mungle, Odzi, for a period of farm training.

Mr. and Mrs. G. W. Pickard.—Arrived from Great Britain on 5th June and have since been accommodated at Gwebi Farm.

Messrs. Garland and Adams.—Arrived from Great Britain on 8th June and are now undergoing training on Mr. F. C. Peek's farm Teign, Concession.

P. E. J. Cranford.—Arrived from Great Britain on 8th June and has obtained employment on Shamva Mine.

Mr. and Mrs. T. B. Gibbins.—Arrived from Great Britain on 12th June and have been accommodated on Mrs. Munch's farm, near Rusape.



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Mr. and Mrs. C. Baines.—Arrived from Great Britain on 12th June and have since been accommodated on Gwebi Farm.

A. Kinglerley.—Arrived from Great Britain on 19th June on tour of inspection.

Mr. and Mrs. K. T. Ford.—Arrived from the Union on tour of inspection.

A. Henderson.—Arrived from the Union on tour of inspection.

T. G. Wall.—Arrived from Great Britain on 29th June and proceeded to Goromonzi Estate for a period of farm training.

C. H. Balfour.—Arrived from Great Britain on 29th June and is now with Mr. W. A. Beattie, Dunphaile, P.B. Salisbury.

L. B. Glen.—Arrived from Great Britain on 29th June and has been placed for training with Mr. A. Gilchrist, The Warren, Salisbury.

# Southern Rhodesia Veterinary Report.

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May, 1928.

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## AFRICAN COAST FEVER.

No case of this disease has occurred.

## ANTHRAX (Bulalima-Mangwe).

One case occurred on the infected area and two on an adjoining farm; the herd was inoculated immediately.

## QUARTER-EVIL.

Heavy mortality was recorded on the farm Mayfield, Melsetter district, and cases reported from various districts.

## TRYPANOSOMIASIS.

Thirteen cases were reported in both the Melsetter and Hartley districts and several in Lomagundi and Bubi districts.

## SCAB.

One flock was placed in quarantine for this disease in Melsetter district.

## HORSE-SICKNESS.

Four cases reported, one in each of the following districts:—Gwelo, Salisbury, Marandellas and Mazoe.

## MYIASIS (SCREW-WORM).

Cases reported in various areas.

## TUBERCULOSIS.

Eighty-four cattle were tested for tuberculosis on importation, and one re-acted, which was destroyed.



## IMPORTATIONS.

From the Union of South Africa: Bulls, 284; cows, 74; horses, 47; mules, 36; donkeys, 8; sheep, 1,477; goats, 840; pigs, 77.

## EXPORTATIONS (CATTLE).

To the Union of South Africa: For local consumption, 1,522; for export overseas, 5,864. To Belgian Congo: Slaughter, 4,545; breeding, 11. To Portuguese East Africa: Slaughter, 36; breeding, 5.

## EXPORTATIONS (MISCELLANEOUS).

To Northern Rhodesia: Sheep, 337; goats, 84. To Belgian Congo: Sheep, 98; goats, 98; pigs, 318. To Union of South Africa: Goats, 109; pigs, 74. To Portuguese East Africa: Goats, 30; sheep, 40.

J. M. SINCLAIR,

Chief Veterinary Surgeon.

## Southern Rhodesia Weather Bureau

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JUNE, 1928.

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**Pressure.**—The mean barometric pressure for the month was below normal, a maximum low occurring at Salisbury on the 19th.

**Temperature.**—The temperature for the month was above normal generally. It varied from 6.0° F. above normal at Umtali to 2.0° F. below normal at Riverdene North (Victoria district). The mean maximum temperatures varied from 6.0° F. above normal at Tuli to 6.2° F. below normal at Riverdene North. Minimum temperatures varied from 10.1° F. above at Sipolilo to 1.4° F. below at Tuli. There was little frost except at Fort Victoria, where 12° was registered on the 28th. Humidity was below normal in most places.

### WEATHER NOTES.

#### Zone C.—

##### *Gatooma.*—

The month of June has been generally warm and at times sultry, with light winds only until the 26th, when the temperature dropped suddenly and the wind increased considerably, the lowest maximum daily temperature for the month being 63° on the 30th. No frosts have been recorded at this station this season.

##### *Salisbury.*—

The mean pressure for the month was below normal. There were three short periods of high pressure, but usually it was far below normal. No rain was recorded. The days were usually cool and temperate, but became very cold from the 27th, when frost was recorded, until the 29th. Frost was also recorded on the 11th. Strong and very cold winds took place on the 29th and 30th, otherwise the wind was moderate.



The 9 a.m. temperature on the 30th—46.3° F.—was the lowest on record. Not much cloud was observed, one day, the 23rd, being overcast.

### Zone E.—

#### *Riverdene North.*—

On the whole this month has been warmer than usual for the time of year. The thermometer reached 80° on the 3rd, the first time since 16th April, and the temperature remained mild until the 27th, when we experienced high winds from the north and south-east quarters, which lowered the record, and heavy frosts followed, the most severe being 10° on ground on 27th. The weather has been fine generally with bright days, except at the end of the month. No rain has fallen and not much dew, but on two mornings we had mists. The grass naturally is frosted, although there is still a little green picking in sheltered situations. The River Popotekwe is still running, but gradually dropping and sand-banks are appearing.

#### *Victoria.*—

The month was fine and warm until the 25th inst., when there was a sudden change and a cold spell set in, the temperature falling 14°. There was severe frost on the 28th, 29th and 30th, which I am informed has done quite a lot of damage to growing crops. Winds have been variable and cold latterly.

## RAINFALL.

### ZONE A.

#### BULALIMA-MANGWE—

Riverbank ... ..	.04
Solusi Mission ... ..	.09

#### BULAWAYO—

Keendale ... ..	.06
St. Peter's Diocesan School ... ..	.02

#### GWELO—

Brockenhurst ... ..	.01
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#### NYAMANDHLOVU—

Naseby ... ..	.03
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## UMZINGWANE—

Springs ... ..	.03
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## ZONE B.

## BELINGWE—

Bickwell ... ..	.01
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## BULALIMA-MANGWE—

Bruwapeg ... ..	.05
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Fallowfield ... ..	.05
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## GWANDA—

Gwanda Gaol ... ..	.09
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## MATOBO—

Fort Usher ... ..	.02
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Holly's Hope ... ..	.09
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Mtshabezi Mission ... ..	.06
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## UMZINGWANE—

Balla Balla ... ..	.11
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Essexvale ... ..	.02
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## ZONE C.

## CHARTER—

The Range ... ..	.04
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## CHILIMANZI—

Orton's Drift ... ..	.10
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## GWELO—

Cross Roads ... ..	.04
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## HARTLEY—

Currandooley ... ..	.06
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Sunny Bank ... ..	.03
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## LOMAGUNDI—

Devonia ... ..	.01
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Mica Field ... ..	.04
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Sipolilo ... ..	.37
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Umvukwe Ranch ... ..	.10
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## ZONE D.

## DARWIN—

Mount Darwin ... ..	.67
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## INYANGA—

Juliasdale ... ..	.05
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## MARANDELLAS—

Fault Farm ... ..	.17
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## MAZOE—

Argyle Park ... ..	.10
Donje ... ..	.12
Glen Grey ... ..	.01

## MREWA—

Mrewa ... ..	.26
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## MTOKO—

Makaha ... ..	.09
Mtoko N.C. ... ..	.05

## SALISBURY—

Arcturus ... ..	.03
Chindamora Reserve ... ..	.35
Datata ... ..	.13
Goromonzi ... ..	.15
Kilmuir ... ..	.13
Vainona ... ..	.06

## ZONE E.

## BIKITA—

Angus Ranch ... ..	.02
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## CHIBI—

Lundi ... ..	.02
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## CHILIMANZI—

Allanberry ... ..	.02
Mukowries ... ..	.02

## INYANGA—

St. Trias' Hill ... ..	.16
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## MAKONI—

Forest Hill ... ..	.16
Mona ... ..	.04
Springs ... ..	.01

## MARANDELLAS—

Macheke ... ..	.09
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## MELSETTER—

Brackenbury ... ..	.45
New Year's Gift ... ..	.05

## NDANGA—

Doornfontein ... ..	.03
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## UMTALI—

Odzani Power Station ... ..	.14
Park Farm ... ..	.03
Premier Estate ... ..	.01
Sheba ... ..	1.28
Stapleford ... ..	.83
Umtali Gaol ... ..	.01

## VICTORIA—

Cheveden ... ..	.04
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## ZONE F.

## MELSETTER—

Chikore ... ..	.09
Melsetter ... ..	.19
Mount Selinda ... ..	.22
Vermont ... ..	.05



# Export of Cattle from Southern Rhodesia, 1928.

Month	Union		Eng-land.	Congo		N. Rho-desia	Portuguese East Africa.			Total
	Slaughter	I. C. S. for overseas	Slaugh-ter	On hoof	Slaughter	Breeding	Slaughter	Trek	Breeding	
...	55	...	...	1,370	39	...	108	...	...	1,572
January	190	...	...	2,287	453	...	111	...	...	3,041
February	562	2,746	...	4,257	13	192	39	...	...	7,809
March	957	4,927	...	3,468	12	193	84	...	...	8,641
April	1,522	5,864	...	4,545	11	...	36	...	...	11,983
May	2,278	6,000	...	1,505	949	...	177	...	5	10,914
June	...	...	...	...	...	...	...	...	...	...
July	...	...	...	...	...	...	...	...	...	...
August	...	...	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...

J. M. SINCLAIR,

Chief Veterinary Surgeon.

# Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	August.	Sept.
Ayrshire—Sipolilo	Various farms	G. H. Cautherley	1928	1928
Banket Junction	Banket Hotel	A. M. Hutchinson	11	8
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	3	7
Bindura	Bindura Farmers' Hall	W. E. Fricker	30	27
Bromley	Farmers' Hall, Bromley Siding	E. Somerville-Collie	10	14
Bubi	Queen's Mine	C. H. Olsen	1	5
Chakari	Various farms	L. T. Tracey	14	11
Daisyfield	Daisyfield (August), Somabula (Sept.)	L. E. Edwards	15	19
Darwendale—Trelawney	Various farms	B. G. Theck	18	8
Eastern Districts	Farmers' Hall, Chidza	W. E. Richards	22	26
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	11	8
Enterprise	Farmers' Hall	James Watson	7	4
Essexvale	Essexvale	Col. D. Judson	7	4
Felixburg—Gutu	Fairburn (August)	C. L. Burrows	19	16
Figtree Branch, R.L. and F.A.	Figtree Hotel	The Secretary	11	8
Gadzema	Gadzema	M. G. Leahy	7	4
Gatooma	Speck's Hotel	B. L. Henderson	10	14
Gatooma (Golden Valley Branch)	Golden Valley Hotel	C. K. James	18	15
Gazaland (South Melsetter)	Chipinga Hotel	Mrs. C. N. Reading	11	8
Greystone	Quarrie Farm	P. J. van der Walt	6	3
Gwanda	Timber Farm (Mr. N. J. B. Nilson)	N. B. Nilson	No fixed	dates
Hartley	Old Schoolroom, Hartley	E. Etheredge	25	22
Headlands	Headlands	J. A. Eve	25	29
Hunter's Road	Hunter's Road	J. W. Watkinson	25	29
Insiza South	Farm Lancaster	J. Campbell	9	13
Inyazura	Inyazura	W. P. Frudd	3	7
Lalapansi	Lalapansi	Edmund Chapman	11	8
Lomagundi	Sinoia	F. W. Robertson	...	...
Lomagundi West	Various farms	T. W. Williamson	5	30
Macheke	Farmers' Hall, Macheke	The Secretary	...	...
Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	T. R. Colam	4	1
Makwiro	Makwiro	F. H. Howard	17	21



Makoni	Rusape	1
Marandellas	Marandellas Farmers' Hall	7
Marandellas, Southern	Various farms	5
Mashonaland	Mashonaland Farmers' Hall, Salisbury	14
Matabeleland	Library Buildings, Bulawayo	13
and Cotton Growers' Association		
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malundni	15
Mazoe (Concession)	Concession Hotel	14
Mazoe (Glendale)	Farmers' Hall, Glendale	12
Melsetter	Court House, Melsetter	13
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	12
Ngezi-Umniati	Harveston, Enkeldoorn	29
North Umriati		received
Norton and Lydiat District	Norton	7
Nyamandhlovu	Nyamandhlovu	...
Odzi District Farmers	Odzi Hotel	1
Poorte Valley	Various places	15
Que Que	Offices of the Que Que Sanitary Board	15
Salisbury South	Various farms	26
Selukwe	The Hotel, Selukwe	7
Shamva	Shamva Hotel	20
Two Rivers Farming Association	Various farms	15
Umboe (Branch of Lomagundi F.A.)	Various farms	8
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	8
Umtali	Drill Hall, Umtali	6
Umvuma and District	Umvuma	received
Victoria	Victoria	1
Wankie District		received
Western	Plumtree Hotel	8
Willoughbys	Willoughbys	Not received

## Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
De Grendel Rita	Friesland	2,042.00	...	60	C. A. Blackwell, Norton
Sally ...	Shorthorn	2,956.20	136.22	200	G. Cooper, Essexvale
Zazkins ...	do	2,405.90	98.86	126	do do
Key ...	do	1,349.70	53.85	73	do do
Pepper ...	do	1,562.40	67.89	77	do do
Morgenzon Halsband	Friesland	1,350.40	...	105	J. Gifford, Trelawney
Morgenzon Berola	do	1,447.00	...	105	do do
Morgenzon Twillie	do	1,167.20	...	105	do do
Theater ...	Grade	1,272.10	...	91	do do
Albanie ...	Friesland	1,023.50	...	49	do do
Kebanie ...	do	985.90	...	42	do do
Dapple ...	Friesland	1,049.00	...	30	A. T. Holland, Chatsworth
Princess ...	do	820.00	...	30	do do
Palm Tree Milly	do	8,709.00	...	396	M. Inge, Sinoia
Palm Tree Neeltje	do	6,689.00	...	266	do do
Palm Tree Buttercup	do	5,870.00	...	228	do do
Palm Tree Ethel	do	4,494.00	...	164	do do
Langton Nessie	do	1,424.00	44.14	68	do do
Langton June...	do	894.00	27.15	43	do do
Groenvlei	do	3,548.55	...	90	W. S. Mitchell, Iron Mine Hill
Bedford Alberta	Grade	7,377.25	...	330	C. R. Strickland, Shamva
Sally ...	Friesland	6,891.00	...	300	do do
Jane ...	do	6,721.75	...	300	do do
Betty ...	do	968.75	...	30	do do
Freesia ...	do	775.50	...	30	do do
Mona ...	do	12,986.00	445.98	360	W. R. Waller, Salisbury
Ogden Hall Alberta	Friesland	6,732.75	231.63	300	do do
Bluff Hill Felicity	do	7,248.00	242.70	180	do do
Bluff Hill Flora	do	4,331.75	153.89	150	do do
Bluff Hill Faith	do	2,173.75	72.71	60	do do
Bluff Hill Floss	do	9,500.75	325.08	300	do do
Dunovan Nora	do	7,787.75	262.20	180	do do
Dunovan Pearl	do	6747.00	224.59	300	do do
Marie of Bittan	do	9,542.25	323.49	300	do do
Mulder's Vlei	do	8,006.50	275.91	300	do do
Wiepkje II.	do	7,576.50	258.16	240	do do
Herbert's Hope Iris	do				
Wolseley Josephine II.	do				



## RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
De Grendel Sophie	Friesland	6,740.00	226.05	150	W. R. Waller, Salisbury
De Grendel Rebelina	do	2,885.00	98.01	60	do d
Harlen s Quest	do	3,921.75	133.30	90	do do
De Grendel Bessie	do	8,065.25	238.26	217	Gwebi Experiment Farm
De Grendel de Hoop	do	4,783.75	133.63	117	do do
De Grendel Froukje	do	4,176.25	107.04	101	do do
De Grendel Selina	do	3,105.50	84.13	63	do do
De Grendel Laura	do	747.50	19.43	28	do do
Flora of Elsmore	do	3,739.50	135.11	149	do do
Wit Fancy ...	do	3,899.00	107.75	149	do do
Pel Fancy ...	do	4,649.00	145.95	149	do d
Minnosa Pel	do	3,260.50	112.88	125	do do
Stiensers					
Minnosa Pel Clara II.	do	2,639.00	83.66	70	do do
Isa ...	Grade Friesland	9,682.00	263.75	333	do do
Waterbloem ...	do	11,241.75	299.45	344	do do
Roodebloem ...	do	6,055.75	150.73	252	do do
Janie ...	do	6,919.25	211.71	252	do do
Antbloem ...	do	5,864.00	153.35	199	do do
Fanny ...	do	6,661.25	195.28	185	do do
Lucy ...	do	3,474.50	89.34	125	do do
Katie ...	do	3,447.50	99.64	105	do do
Roza ...	do	3,156.50	74.76	109	do do
Kleinbloem ...	do	3,026.25	88.67	93	do do
Gwebi	do	1,941.75	56.11	93	do do
Waterbloem					
Gwebi Janie ...	do	260.00	7.80	14	do do
Hannah ...	do	4,116.25	127.09	93	do do

# Farming Calendar.

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## August.

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### BEE-KEEPING.

This month is one of inaction as far as the apiarist is concerned and the hive inmates are best left alone, except that once a week a corner of the quilt on the top crate may be lifted to see if the wax moth has gained a footing, as may easily be the case in a colony weakened by death from sundry causes, and in which case all such frames should at once be removed. Towards the end of the month, with warmer weather, the bees will be tempted out for play spells, cleansing flights, etc., and, according to the season, entrance stops may be opened out slightly with advantage.

In the workshop see that a spare hive or two are in readiness, well painted and ready for use at any hour; also have in readiness any requisite spares, and see that all appliances, such as veil, smoker, fuel, etc., are handy, for swarms may now go and come at a few minutes' notice. Where the bees have been left to their winter quarters with a fair supply of food, good results can confidently be looked forward to for the coming honey flow of the early winter weeks.

### CITRUS FRUITS.

The first or spring growth should commence about the middle of the month, and the trees should have a good soaking when the new growth commences. If Washington Navel oranges are to set their main crop, frequent irrigations must take place from the time of blossoming up to the rainy season. These irrigations create the necessary humid conditions which are so essential to secure a satisfactory setting of this orange. It is advisable to stimulate the growth of unthrifty trees with an application of one to one and a half pounds of nitrate of soda when the first irrigation is given, this application of fertiliser to be followed by good cultivation. The amount of fertiliser recommended is for mature trees. The packing of late varieties will continue throughout the month. No bearing trees should suffer for want of moisture. Irrigation should not take place immediately before the harvesting of export fruit—at least ten days should elapse between irrigation and the harvesting. This is the best month to cut down citrus trees for re-working to better varieties. As the citrus trees are harvested, all dead, diseased and broken branches and shoots should be carefully cut out before the trees come into new growth.

### CROPS.

Winter work on the land will become more difficult. Farmyard manure can be carted, spread and ploughed under. Sweet potatoes which have been allowed to remain in the ground will be lifted as required. Any main crop Irish potatoes not yet lifted should now be taken up and seed potatoes should be worked over and diseased tubers removed.

Green oats or barley fodder grown under irrigation or on wet vleis will be available for cutting.



In frost-free areas early irrigated or wet land potatoes can be planted; also water melons and maize for green fodder.

Consideration should now be given to the important question of what crops will be grown next season. Supplies of farm-grown seeds should be got ready, and where purchases are necessary, orders both for seeds and fertilisers should be placed.

### DAIRYING.

At this time of the year the farmer should experience very little difficulty in producing cream of first-grade quality. As a rule the weather is sufficiently cold to prevent cream, produced under average conditions, from undergoing rapid deterioration, and it is not usually necessary, therefore, to separate a cream of such high butter fat content as is required during the warmer months of the year. During the winter months the separator should be adjusted so as to deliver cream testing 40 to 45 per cent. butter fat.

On exceptionally cold days care should be taken that the milk is not allowed to become too cold before separation—for efficient skimming, the milk should be separated immediately after milking and at a temperature not lower than 90 degrees F.

Farmers engaged in butter-making are usually successful in obtaining a good grain and firm body in butter at this season of the year. Cream can quite easily be cooled to churning temperature if placed outside the dairy and exposed to the atmosphere overnight. During cold weather, however, it is more frequently necessary to warm the cream for churning. The most satisfactory method of warming the cream to the proper churning temperature is to place the bucket or receptacle containing the cream in a tub or bath of water at a temperature of about 95 degrees F., stir the cream frequently and replace the water when cold.

This is usually a critical time of the year for young dairy stock. For dairy heifers, weaned calves, etc., there is possibly no better ration than one consisting of maize silage, legume hay and mixed concentrates, and these feeds, if supplied in liberal quantities, should serve to keep the young stock in a thrifty, growing condition.

### DECIDUOUS FRUITS.

All plantings of deciduous trees should be completed by now, as the late planting of these trees is generally unsatisfactory. Pruning may be continued up to the middle of the month. It is advisable to water or irrigate all deciduous trees before blossoming; if possible, a second irrigation should be given after the trees have set their fruit. Follow up the irrigations with good cultivation.

### ENTOMOLOGICAL.

Potato.—Early planted crops of potatoes may be attacked by caterpillars. The crops should be sprayed immediately with an arsenical wash.

Cabbage Family.—Young plants of this family should be kept sprayed with an arsenical wash to check attack by webworm. Do not spray plants of which the foliage is to be eaten within three weeks of use.

Onion.—May still be troubled with thrip. Use tobacco wash or paraffin emulsion.

Citrus Trees.—May be sprayed or fumigated against scale insects, having regard, however, to presence of fruit and blossom. Spraying and fumigating for scale should not be carried out whilst trees are in blossom. Clear young growth of aphids previous to blossoming, using nicotine, tobacco wash or Derris.

Guava.—Collect and destroy remnants of late crops to keep down citrus codling, especially if trees are in vicinity of citrus orchards.

### FLOWER GARDEN.

Complete digging or forking over the soil as early as possible. Divide and replant dahlias, delphiniums, Shasta daisies, etc. Plant bulbs—tuberose, arum lilies and gladioli. Sow seeds of hardy annuals. Mulch newly-planted roses, shrubs, etc.

### VEGETABLE GARDEN.

Plant out asparagus, cabbage, cauliflowers, onions and early potatoes. Sow seeds of tomato and other plants that are susceptible to frost in a sheltered position; also seeds of various vegetables and salads for summer use.

### FORESTRY.

Cuttings of ornamental shrubs, roses, etc., struck in sand last month should be transplanted into good soil as soon as they show a good healthy growth of leaves. A large percentage of cuttings will damp off if left in sand longer than about six weeks. No manure should be added to the potting soil. Seed beds should be prepared and gum seeds sown if required for planting early in the season. If the trees are to be grown in seed beds only and not in tins, then gum seeds should not be sown until October, or later, as they will get too large.

### GENERAL.

Fire guards should be completed and every precaution taken to guard against loss of grazing from fires. Natives commence ploughing their softer land this month, and for this reason, as well as because beer is plentiful at the kraals, local labour is apt to be scarce. At this time of the year, however, the need for boys on farms is not so severely felt as later on.

### POULTRY.

By the end of this month all those who are not able to give much attention to the chicks while in the growing stage should have stopped hatching. Those who can give some extra care, can continue hatching for another month, but not later, for chicks hatched after August are usually slow in growth and weedy. They do not lay till some months after they should, and eggs are few in number; in fact, they are generally unprofitable.

Now that the hot weather is approaching, a constant war on insects must be carried out, and of these sand fleas and fowl ticks (erroneously called tampons) will be found to be the most troublesome. A bulletin on fowl ticks can be obtained upon application to the Poultry Experts, Department of Agriculture. Sand fleas, as most poultry keepers know, are found on the face, wattles, ear-lobes and combs of the birds. Application of carbolised vaseline will usually kill them at once, or two or three applications of any ordinary grease on successive days are efficacious. More than this is, however, necessary, for the breeding quarters of these insects (and they multiply very rapidly) are in the dust on the floor of the house and that of the run.

The best preventive is a hard floor (preferably of concrete) with no cracks. If this is not possible, the floor and around the house should be treated every week in one of the following ways:—(1) Thorough soaking with a solution of one teacupful of Kerol, Jeyes, Hycol, Izal, or similar disinfectant to a paraffin tin of water, or (2) with a strong solution of salt and water, or (3) dusting over and raking into the soil a mixture of one part flowers of sulphur and two parts finely powdered lime.

Ducks.—See that the breeding ducks have plenty of water, and if possible also some to swim in. Keep young ducklings out of the hot sun, otherwise there will be many deaths. The same applies to geese and goslings.

Turkeys.—Young turkeys must be protected from cold at night, for this is fatal to them. Give them as much free range as possible, and do not allow them to run round the house or on the same ground as fowls do.



Turkeys like clean ground; any that is tainted is very detrimental to them. Let them find most of their food in the bush.

#### STOCK.

Cattle.—On the early granite and sand veld probably the worst of winter is over so far as grazing is concerned, and a nice bite of green grass is appearing. Care should be taken where cattle are allowed to graze on the early burnt grass not to let them get too much at first. On red soil farms the haystack will still be required, and in all cases a certain amount of hay or ensilage should be held in reserve against the possibility of very late rains. The bulls may again be put back into the herds. Any very young calves should be kept near home, and dipping should be carefully attended to. In dairy herds on any soil whatever, feeding, housing and bedding cannot be relaxed. Cows in full milk will benefit by a ration of, say, 5 lbs. of maize (crushed and soaked), 30 lbs. to 40 lbs. of ensilage or pumpkin and 8 or 10 lbs. of hay. If it is possible to give, in addition to the above daily ration, 2 lbs. of peanuts, crushed with the shell, or linseed ground with maize, or oil cake, a very great benefit will be derived. Calves, especially young ones, must be carefully watched; they should not run too far, and are better inside, except when the weather is warm. It will pay to feed to them a little sweet hay, bean meal, linseed, peanuts or peanut cake and a small ration of green food.

Sheep.—Sheep should give little trouble at this time of the year, but on very dry veld a handful of mealies and a little hay or ensilage will materially assist ewes with young lambs.

#### TOBACCO.

The seed bed site should be cleared and well ploughed, preparatory to burning and sowing. The usual date of sowing the first beds is the 15th September. Bulletins covering every phase of tobacco culture can be had upon application to the Editor.

#### VETERINARY.

Redwater and gall-sickness occur all the year round, although these diseases are more prevalent during the summer months. A good many deaths occur this month, however, amongst imported stock. Vegetable poisoning will probably be in evidence. Sheep can be inoculated against blue tongue. Scab is a poverty winter disease.

#### WEATHER.

No rain is to be expected, and even on our eastern mountains the precipitation is trifling. Showers, however, do occasionally fall in places, but are of no consequence. The sun is often warm during the day, but the nights are apt to be cold, and grazing being scarce, food and shelter are necessary for the stock.

## Seed for Sale, 1928.

	s.	d.
Salisbury White Maize ... .. per 100 lbs.	20	0
Salisbury White Maize, 2nd quality, per 100 lbs.	12	6
Kherson Oats ... .. per 100 lbs.	20	0
(Only a small quantity available.)		
Kinvarra Oats ... .. per 100 lbs.	25	0
Ground Nuts ... .. per 100 lbs.	17	6
Dolichos Beans ... .. per 100 lbs.	20	0
Velvet Beans, White ... .. per 100 lbs.	20	0
Linseed (Flax J.W.S.) ... .. per lb.	0	6
Boer Manna ... .. per lb.	0	4
Red Manna ... .. per lb.	0	4
Sunn Hemp ... .. per 100 lbs.	30	0
Under 100 lbs. ... .. per lb.	0	4
Majorda Seed ... .. per lb.	1	0
Sunflower (Large Black) ... .. per 100 lbs.	15	0
Sweet Potato Tubers (Calabash Leaf),		
(Available July and August) per bag of 150 lbs.	10	0
Sweet Potato Slips ... .. per bag	5	0
Napier Fodder Roots ... .. per bag	5	0
Kikuyu Roots ... .. per bag	5	0
Seed Potatoes (Up-to-Date) ... per bag of 150 lbs.	17	6

Prices are f.o.r. Gwebi. Before sending cheques, intending purchasers are advised to ascertain that the seeds required are still available. Cheques should be made payable to "Gwebi Farm." Orders and enquiries should be addressed to the Chief Agriculturist, Salisbury.

*Note.*—When remitting money in payment of seeds, etc., to assure prompt dispatch, it is necessary that railage should be included when goods are to be railed to a siding.



# Government Notices.

No. 476.]

[13th July, 1928.

## AFRICAN COAST FEVER.

HIS Excellency the Governor-in-Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notice No. 298 of 1928, and, in terms of section 18 of Government Notice No. 641 of 1927, to declare the following areas of infection and guard area:—

### (a) Areas of Infection.

#### 1. Umzingwane Native District.

The farms Longfield, The Range, Glen Lategan, plots 85 to 102 Essexvale Estate, Ballarat and Emangeni.

#### 2. Matobo Native District.

The farms Adams and Florencedale and that portion of the north-east corner of the Matopo Reserve cattle from which dip at Glen Lategan tank.

### (b) Guard Area.

#### Matobo Native District.

That portion of the Matopo Reserve dipping at Mbejha tank.

The above notice releases the following farms from all restrictions:—

**Umzingwane District.**—Inyankuni, Bushy Park, Essexvale Estate, excluding plots 85-102, Hilton, Woodlands, Enyema, Clarkes, Swaithes, Limerick, Lynchs, Kirby Henderson.

**Matobo District.**—Gwandavale, Kesi, Senungu, Shentsheli, Malage, Luma, Natisa, Sebuntuli, Manyoni, Maleme, Clivedon, Shama, Alalie, Matopo Block, Wenlock Block, Matopo Reserve, except that portion dipping at Mbejha tank, Absent, Brethren-in-Christ, Matopo Vale, Honeydale, Cardross Park.

**Gwanda District.**—Deneys.

**Bulalima-Mangwe District.**—Bromley, Bickley, Beckenham, Penge, Norwood.

No. 417.]

[22nd June, 1928.

## AFRICAN COAST FEVER.

HIS Excellency the Governor-in-Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notice No. 328 of 1928, and, in terms of section 17 of Government Notice No. 21 of 1917, to declare the following area of infection and guard area:—

### Umtali Native District.

#### (a) Area of Infection.

The farms Zimunya's Town and Howth.

#### (b) Guard Area.

An area bounded by and including that portion of the farm Lowlands lying south of the railway line; the fenced slaughter area

on Umtali Commonage; the farms Fern Hill, The Rhine, that portion of the Zimunya's Reserve lying east of the Impodsi River; thence along the southern boundaries of the farms Howth, Greendale, Scandinavia, Norseland and Valhalla; thence along the Portuguese boundary to Laurenceville.

This notice effects the removal of the western portion of the Zimunya's Reserve and Gilmerton from quarantine.

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No. 449.]

[6th July, 1928.

IT is hereby notified that His Excellency the Governor has been pleased, in terms of section 4, sub-section (1) of the "Game Law Consolidation Ordinance, 1906," to declare that game of classes "A" and "B" of the above-mentioned Ordinance shall be protected and not hunted or destroyed for a period of two years from the date hereof, in the area described hereunder:—

Description of Area.

A portion of the Mrewa district lying immediately south of the Uzumba Native Reserve and north-east of the Mangwendi Native Reserve, bounded by the Nyadiri River and the boundaries of these reserves.

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No. 458.]

[6th July, 1928.

IT is hereby notified that His Excellency the Governor has been pleased, in terms of section (2) of "The Road Regulations, 1896," to approve of the declaration of the following road as a branch road:—

From a point on the farm Wilton forming a junction with the main Salisbury-Umtali Road; thence running in a northerly direction across that farm and the farms Alma, Odzi Rapids, Clare Estate and Inyamajura, to a point on the latter farm.

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No. 459.]

[6th July, 1928.

IT is hereby notified that His Excellency the Governor has been pleased, in terms of section (2) of "The Road Regulations, 1896," to approve of the declaration of the following road as a branch road:—

Starting from a point on the Veracity-Gwelo Road on the farm Keynshamburg; thence proceeding in an easterly direction across that farm, through the northern corner of Broomrigg; thence continuing in the same direction across the following sub-divisions of Clifton Down, viz., Durham and Northumberland; thence proceeding in the same direction through Westmoreland, a sub-division of Fife Scott Block, to Manyame Siding.

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No. 418.]

[22nd June, 1928.

IT is hereby notified that His Excellency the Governor has been pleased, in terms of section 5 of the "Pounds and Trespasses Ordinance, 1903," at the request of the Civil Commissioner, Bulawayo, to abolish the pound established at Thornville, Insiza native district, under Government Notice No. 458 of 1922, and to establish a pound at Dhlo Dhlo Farm, Insiza native district, which pound will be available for the public as from the 18th June, 1928.



## Departmental Bulletins.

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The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

### AGRICULTURE AND CROPS.

- No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
- No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
- No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
- No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
- No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
- No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
- No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 374. Fibre Crops, by J. A. T. Walters, B.A.
- No. 388. Kudzu Vine, by H. G. Mundy, F.L.S.
- No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
- No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
- No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
- No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
- No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
- No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters, B.A.
- No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.
- No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.
- No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.
- No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 539. Barley Growing.
- No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
- No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.
- No. 550. Onion Growing under Irrigation, by C. Mainwaring.
- No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.
- No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
- No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
- No. 591. Maize Export Conference Proceedings.
- No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
- No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
- No. 601. Maize for Export, by S. D. Timson.

- No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 616. The Ground Nut or Monkey Nut, by C. Mainwaring.
- No. 627. The Growing of Potatoes in Southern Rhodesia (Revised), by C. Mainwaring, Agriculturist.
- No. 630. The Storage of Seed Potatoes, by H. C. Arnold.
- No. 634. Barley, by P. V. Samuels.
- No. 643. Noxious Weeds in Southern Rhodesia, by F. Eyles, Botanist.
- No. 650. Coffee Culture in Southern Rhodesia, by G. W. Marshall, Horticulturist.
- No. 651. Two Important Leguminous Crops: The Velvet Bean and Dolichos Bean, by C. Mainwaring, Agriculturist.
- No. 656. Tractor Notes, by A. W. V. Crawley, M.E., F.G.S.
- No. 657. Hay-making in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 663. The Use of Fertilisers and Manures in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.
- No. 672. Hay-making in Rhodesia, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 674. Top Dressing of Maize against Stalk Borer, by H. C. Arnold.
- No. 681. The Sunflower (*Helianthus Annuus*) (Revised), by S. D. Timson, M.C., Dip.Agric.
- No. 684. Warning to Maize Growers: Maize for Export.
- No. 694. The Edible Canna (*Canna Edulis*), by D. E. McLoughlin.
- No. 695. The Castor Oil Plant (*Ricinus* spp.), by S. D. Timson, M.C., Dip.Agric.
- No. 697. Results of Analysis of Samples taken under the "Fertilisers, Farm Foods, Seeds and Pest Remedies Ordinance" during the year 1927-28.
- Botanical Specimens for Identification.
- Maize Grading Regulations.

#### REPORTS ON CROP EXPERIMENTS.

- No. 94. Second Report on Experiments, by J. H. Hampton.
- No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
- No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
- No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
- No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
- No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
- No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
- No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.
- No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.
- No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.
- No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.
- No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.
- No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.
- No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G. Mundy, F.L.S., and E. E. Wright.
- No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.
- No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.
- No. 437. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1921-22, by H. G. Mundy, F.L.S.



- No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.
- No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.
- No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.
- No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.
- No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923-24, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 564. A Maize Rotation Experiment, by A. R. Morkel.
- No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 608. Annual Report of Experiments, 1924-25, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 631. Bulawayo Experiment Station: Annual Report for Year 1925-26, by H. W. Hilliard.
- No. 649. Annual Report of Experiments, 1925-26, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Manager.
- No. 675. Bulawayo Experiment Station—Annual Report for Year 1926-27, by D. E. McLoughlin.
- No. 683. Annual Report of Experiments, 1926-27, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Station Manager.
- No. 685. Notes on Farm Practices at the Government Farm, Gwebi, by S. D. Timson, M.C., Dip.Agric.
- No. 688. Report, 1923-24—1926-27, Gwelo Municipal Demonstration Stations, by D. E. McLoughlin.
- No. 700. Further Notes on Farm Practice at the Government Farm, Gwebi, by S. D. Timson, M.C., Dip.Agric.

## TOBACCO.

- No. 605. Flue-Curing Tobacco Barns, Bulking and Grading Sheds, by P. H. Haviland, B.Sc. (Eng.), Acting Government Irrigation Engineer.
- No. 607. Tobacco Seed Beds, by D. D. Brown.
- No. 614. Notes on Installing the Johnson Patent Furnace, by B. G. Gundry, Office of Irrigation Engineer.
- No. 615. The Culture of Virginia Tobacco in Southern Rhodesia—Field Management, by D. D. Brown.
- No. 617. Dark Fire-Cured Tobacco, by E. M. Matthews, B.Sc., Tobacco Adviser. Fire-Curing Tobacco Barn, by the Tobacco Advisers.
- No. 629. Notes on Flue Curing of Tobacco, by C. A. Kelsey Harvey.
- No. 641. The Handling, Grading and Baling of Cured Virginia Tobacco, by D. D. Brown.
- No. 644. Tobacco Baling Boxes, by B. G. Gundry, Irrigation Branch.
- No. 653. The Care of Tobacco Seed Beds, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A. (Trinidad).
- No. 661. Flue-Curing Tobacco Barns, 12 ft. x 12 ft. x 16 ft., by B. G. Gundry.
- No. 665. Tobacco Pests of Rhodesia, by Rupert W. Jack, F.E.S., Chief Entomologist.
- No. 671. Wildfire and Angular Spot of Tobacco, by J. C. F. Hopkins, B.Sc., A.I.C.T.A.
- No. 676. Mosaic Disease of Tobacco, by J. C. F. Hopkins, B.Sc., A.I.C.T.A.
- No. 679. Tobacco Culture in Southern Rhodesia: The Harvesting and Curing of Virginia Tobacco, by D. D. Brown.
- No. 689. The Lesser Tobacco Wireworms, by Rupert W. Jack, F.E.S.
- No. 690. Thermal Efficiency of Tobacco Barns and Furnaces, by C. L. Robertson, B.A., B.Sc., A.M.I.C.E.
- No. 692. Frenching of Tobacco, by J. C. F. Hopkins, B.Sc., A.I.C.T.A.

## STATISTICS.

- No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.
- No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.
- No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.
- No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
- No. 247. Statistical Returns of Crops Grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.
- No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
- No. 281. Statistics of Crops, 1916-17, by F. Eyles, F.L.S.
- No. 286. Statistics of Live Stock and Animal Produce for the Year 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
- No. 303. Statistics of Crops, 1917-18, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
- No. 322. Statistics of Live Stock and Animal Produce, 1918, by F. Eyles, F.L.S.
- No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.
- No. 380. Statistics of Crops Grown by Europeans in Southern Rhodesia, 1919-20, by H. C. K. Fynn.
- No. 393. Statistics of Live Stock and Animal Produce for 1920, by H. C. K. Fynn.
- No. 409. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1920-21, by H. C. K. Fynn.
- No. 426. Statistics of Live Stock and Animal Products for the Year 1921, by H. C. K. Fynn.
- No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.
- No. 459. Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.
- No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell.
- No. 502. Winter Crops, 1923, by A. Borradaile Bell.
- No. 527. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1923-24, by A. Borradaile Bell.
- No. 543. Statistics of Live Stock and Animal Products for the Year 1924, by A. Borradaile Bell.
- No. 580. Statistics of Summer Crops Grown by Europeans in Southern Rhodesia for the Season 1924-25, by A. Borradaile Bell, Statistician.
- No. 595. Statistics of Live Stock and Animal Products for the Year 1925, by A. Borradaile Bell, Statistician.
- No. 626. Statistics of Summer Crops grown by Europeans in Southern Rhodesia for the Season 1925-26, by A. Borradaile Bell, Statistician.
- No. 646. Statistics of Live Stock and Animal Products for the Year 1926, by A. Borradaile Bell, Statistician.
- No. 682. Agricultural Returns for 1926-7 : Preliminary Returns, by Thomas G. Gibson, Government Statistician.

## LIVE STOCK.

- No. 227. An Experiment in Beef Production, by R. C. Simmons.
- No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.
- No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.
- No. 336. Butchering and Flaying.
- No. 338. From Breeder to Butcher; Beef Feeding Experiment No. 5, by E. A. Nobbs, Ph.D., B.Sc.



- No. 381. From Breeder to Butcher; Cattle Feeding Experiment No. 8, by Eric A. Nobbs, Ph.D., B.Sc.
- No. 421. From Breeder to Butcher; Cattle Feeding Experiment No. 9, Government Experiment Farm, Gwebi, by E. A. Nobbs, Ph.D., B.Sc., F.H.A.S.
- No. 446. From Breeder to Butcher; Cattle Feeding Experiment No. 11, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc., F.H.A.S.
- No. 448. The Cattle Industry.
- No. 468. From Breeder to Butcher; Cattle Feeding Experiment No. 13, by Eric A. Nobbs, Ph.D., B.Sc.
- No. 469. Hand-Rearing of Calves, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 483. From Breeder to Butcher; Cattle Feeding Experiments Nos. 14 and 15, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc.
- No. 584. Merino Sheep in Southern Rhodesia, by H. W. Hilliard.
- No. 624. The Construction of Dipping Tanks for Cattle (Revised).
- No. 698. The Rearing of Bacon Pigs for Bacon Factory Purposes, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 701. Feeding Bullocks at Gwebi, by S. D. Timson, M.C., Dip.Agric.
- Arsenite Cattle Dip--How to Mix.

## DAIRYING.

- No. 383. Control of Temperature in Dairying, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 418. Manufacture of Cheddar Cheese, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 511. Bacon Curing on the Farm, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 520. Treatment of Gassy Curds in Cheese-making, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 530. The Dairy Industry: Causes of Variation in Cream Tests, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 562. Bacteria and the Dairy Industry, by J. R. Corry, B.Sc. (Agr.).
- No. 567. Cottage Cheese, by J. R. Corry, B.Sc. (Agr.).
- No. 572. The Pasteurisation of Milk and Cream, by J. R. Corry, B.Sc. (Agr.).
- No. 577. Cream Cheese, by J. R. Corry, B.Sc. (Agr.).
- No. 583. Cream Cooling Devices, by T. Hamilton, M.A., N.D.A., N.D.D.
- No. 594. Milk Recording and its Advantages, by T. Hamilton, M.A., N.D.A., N.D.D. Introduction by J. R. Corry, B.Sc.
- No. 604. Farm Butter Making, by T. Hamilton, M.A., N.D.D., N.D.A., Dairy Expert.
- No. 606. The Production of Clean Milk, by T. Hamilton and J. R. Corry, Dairy Experts.
- No. 612. Production of First-Grade Cream, by J. R. Corry, B.Sc.
- No. 647. The Feeding of Dairy Stock in Southern Rhodesia, by T. Hamilton, M.A., N.D.A., N.D.D., and J. R. Corry, B.Sc. (Agr.).
- No. 667. Farm Cheese-making, by T. Hamilton, M.A., N.D.A., N.D.D., Dairy Expert.
- Drawings of cow byres and a farm dairy can be obtained upon application to the Dairy Expert, Department of Agriculture, Salisbury.

## VETERINARY.

- No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.  
 No. 313. Obstruction in Sheath of Ox, by J. M. Sinclair, M.R.C.V.S.  
 No. 364. Round-worm Infection of Calves, by H. E. Hornby, M.R.C.V.S.  
 No. 474. Heartwater.  
 No. 480. Measles in Swine, by P. D. Huston, M.R.C.V.S.  
 No. 536. Inoculation of Cattle against Redwater and Gall Sickness, by Ll. E. W. Bevan, M.R.C.V.S.  
 No. 570. The Spaying of Bovines, by G. C. Hooper Sharpe, M.C., M.R.C.V.S., and M. H. Kingcome, M.R.C.V.S.  
 No. 597. Suspected Poisoning of Stock: The Proper Procedure, by M. H. Kingcome, M.R.C.V.S. (Lon.), and A. W. Facer, B.A. (Oxon.), A.I.C.  
 No. 618. Notes from the Veterinary Laboratory: Quarter Evil, by Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research.  
 No. 628. The Influence of Dipping in Solutions of Arsenic upon the Course of Trypanosomiasis, by Ll. E. W. Bevan, M.R.C.V.S.  
 No. 642. The Laboratory Diagnosis of Animal Diseases, by Ll. E. W. Bevan, M.R.C.V.S.  
 No. 666. Notes from the Veterinary Laboratory: Præmonitus—Præmunitus, by Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research.  
 Services of Government Veterinary Surgeons.

## IRRIGATION.

- No. 270. Odzani River Irrigation Scheme, by W. M. Watt.  
 No. 376. Notes on the Water Law of Southern Rhodesia, by R. McIlwaine, M.A., LL.B.  
 No. 384. The Application of Water in Irrigation, by A. C. Jennings, Assoc.M.Inst.C.E., A.M.I.E.E.  
 No. 400. Soil Washing, by A. C. Jennings, A.M.I.C.E., A.M.I.E.E.  
 No. 412. Water Power Resources of Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.  
 No. 452. Weirs and their Construction, by A. C. Jennings, A.M.I.C.E., A.M.I.E.E.  
 No. 475. Soil Washing, by A. C. Jennings, Assoc.M.Inst.C.E., A.M.I.E.E.  
 No. 521. Water: Its Use for Irrigation, by E. V. Flack.  
 No. 529. The Umtali River Irrigation Scheme, by C. P. Robinson, B.Sc.  
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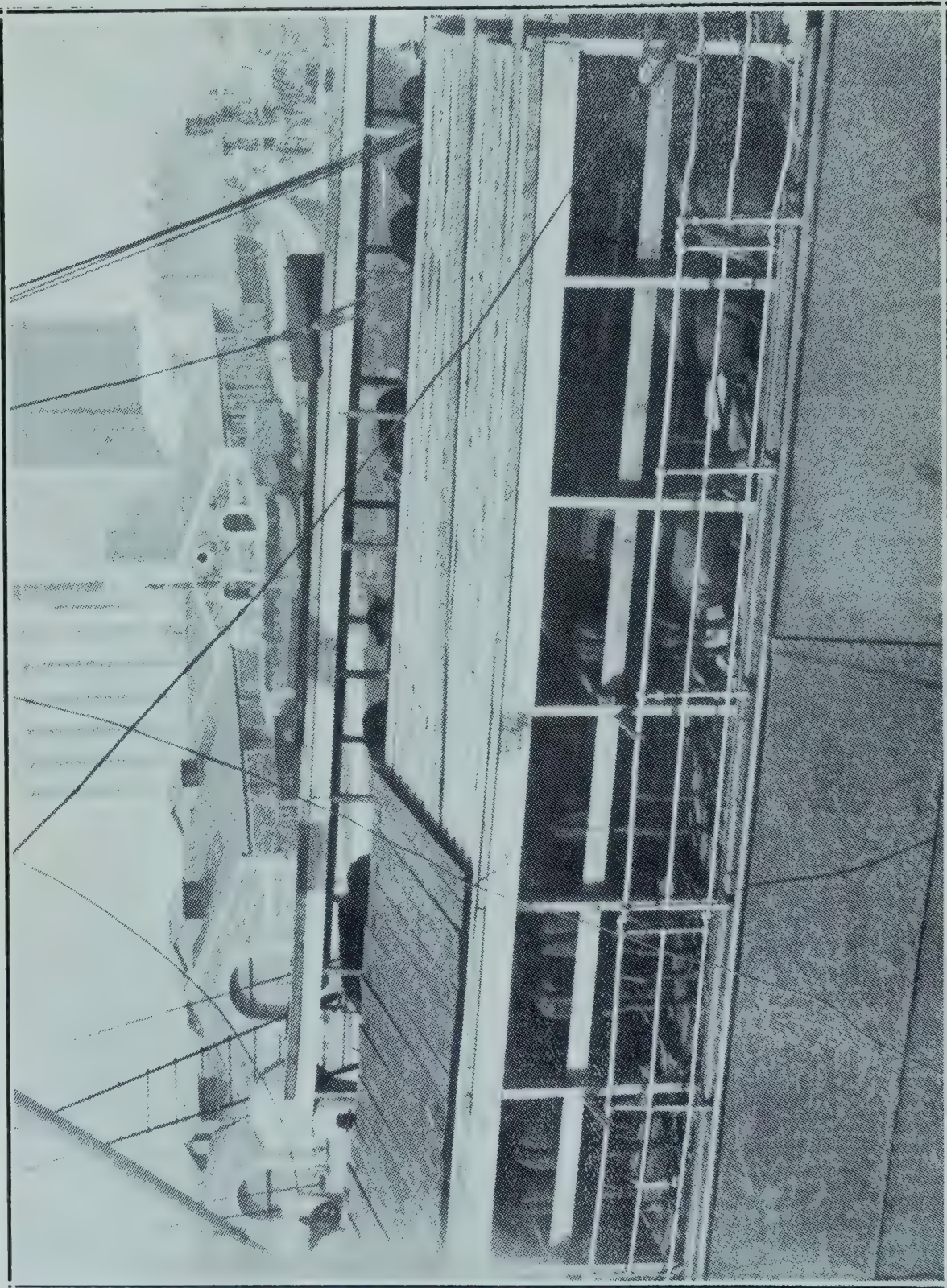
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*Issued by Authority of the Minister of Agriculture and Lands*

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*Editor* . . . . . *William E. Meade.*

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## Editorial.

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*Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.*

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**Pasture Improvement in Southern Rhodesia.**—We would draw special attention to the article which the Chief Chemist contributes to this issue of the Journal on the above subject. It will be seen that reference is made to the research work which it is hoped to commence shortly in the Colony with the object of solving certain pastoral problems. It is a great pleasure to note that this work is to be financed partially by a grant from the Empire Marketing Board and that Southern Rhodesia is to participate in a world wide scheme having for its object the investigation of the mineral content and feeding value of grasses. The work to be undertaken will cover a wide field and will embrace not only the feeding value of the grasses as judged both by chemical analysis and by the animal, but will also include a botanical survey of the pastures and the effect of different treatments on the botanical composition of grassland.

As one of the main essentials of pasture land is permanency, it would appear that our best line of advance would be to concentrate first on the indigenous grasses rather than to undertake extensive experimental work on exotic grasses which throughout the many trials which have been made in this Colony have not proved successful. It is on the lines of the former that the investigation will proceed.

Before leaving this subject it is of interest to note with what importance pasture investigatory work is regarded by the American Society of Agronomy, which reported as follows:—

“The neglect of tame pastures and the abuse of natural pastures is a disgrace to American agriculture. Only the fact that grass will stand an almost incredible amount of abuse has prevented its utter destruction. Relegated to land too rough to till, neglected by the farmer, abused by the farmer, ignored by the investigator, the permanent pastures still furnish at least one-third of the feed consumed by domestic animals. ‘Better pastures’ should become the slogan of American agricultural progress.” Might we add, of Rhodesian agricultural progress also?

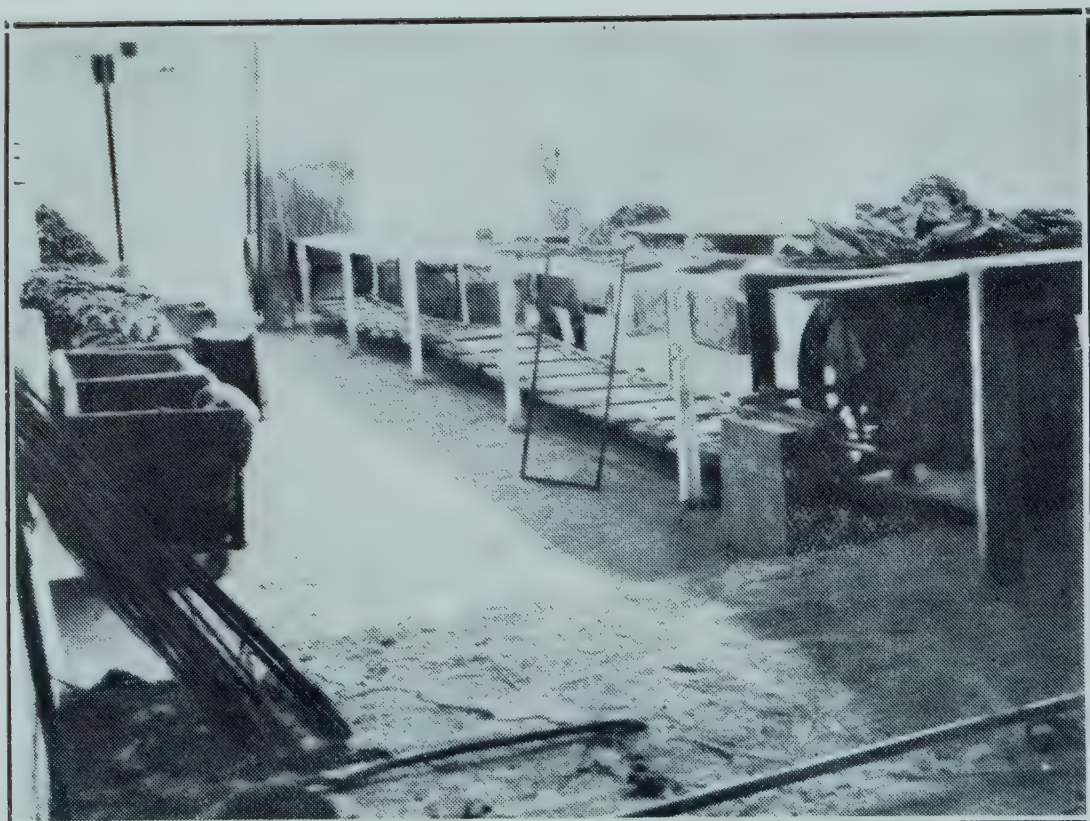
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**Task Work for Natives.**—A correspondent asks for an expression of opinion as to the relative merits of task work and day work for natives employed on farms. His experience is that natives prefer task work and will do more in eight hours on such work than they will do in ten hours on day work. We invite correspondence on this interesting point.

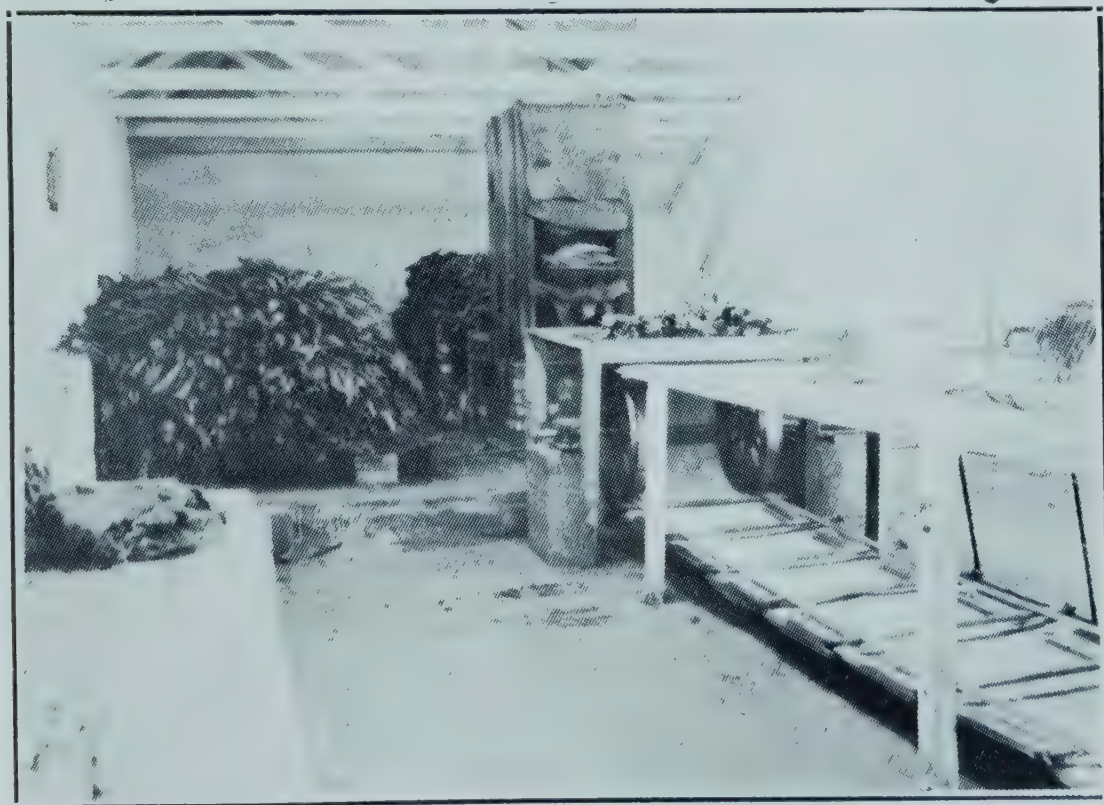
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**An Ingenious Device.**—The illustrations opposite are of a device in operation at Mr. A. H. Phear’s farm, Arrowan, Umvukwes area, for the grading of tobacco leaf. We have only been supplied with meagre details of this device, but we understand that the table is in the form of an endless belt and that the native graders stand on either side. The leaf, after being conditioned by steaming, travels along to the graders, who select their particular grades as the belt moves past them. The effect of this device is that it obviates





Tobacco grading device at Mr. A. H. Phear's farm, Arrowan,  
Umvukwes area.



Showing conditioning chamber, with ungraded tobacco in the background,  
Arrowan farm. (See opposite.)





unnecessary walking to and from the piles of leaf. The belt is operated by a small petrol engine. The second illustration shows the conditioning chamber with the ungraded leaf in the background.

We would take this opportunity of reminding readers that we are at all times very pleased to publish details of any device calculated to effect a saving of labour, and we invite communications of this nature.

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**The Citrus Fruit Export Season.**—From May up to the end of the first week in August nearly 80,000 cases of oranges and grape fruit were railed for export overseas from Southern Rhodesia and Mozambique Territory—a slight increase on the quantity shipped during the same period last season. Of this total, over 61,000 cases were exported through Capetown, approximately 18,000 *via* Beira, and one small consignment from Durban.

S.S. Llandoverly Castle, due to sail from Beira about the end of August, was to take over 14,000 cases to London *via* the Suez Canal. This is equivalent to 592 tons measurement, and far exceeds any previous single trial shipment from Beira.

Overseas salesmen report that the market conditions in the United Kingdom have been exceptionally good so far, thanks to the warm weather, shortage of supplies of English and French summer fruits and Californian citrus, with the result that the best oranges and grape fruit have been realising as much as £2 per box.

Favourable reports have been received regarding the Valencia Late crop now coming forward, and there seems every prospect that by the end of October this season's export crop from Southern Rhodesia and Mozambique Territory will appreciably exceed the 1927 crop of 150,000 cases.

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**London Quarantine Station for Pedigree Stock.**—One of the principal recommendations in the early reports of the Imperial Economic Committee was that part of the Empire

Marketing Fund should be used to defray the cost of transport of pedigree breeding stock to the oversea parts of the Empire. Owing to the restrictions due to the incidence of foot and mouth disease in Great Britain, it was found that a necessary first step towards stimulating the export trade in pedigree stock was the establishment of one or more quarantine stations. A detailed scheme to this end was accordingly submitted to the Empire Marketing Board by the Royal Agricultural Society of England in consultation with the Ministry of Agriculture and approval given for the immediate erection of a station in London. Under the scheme the Royal Agricultural Society of England undertake the responsibility of establishing and administering the station as agents of the Board; the English Ministry of Agriculture are responsible for examining animals before admission to the station, for visiting and inspecting the animals at least once each day throughout the period of quarantine, for providing other official veterinary supervision and for a final veterinary inspection, ensuring a clean bill of health before any animal is loaded on board ship, and the Empire Marketing Board is to bear the capital and overhead maintenance charges.

The quarantine station is situated at the East India Dock, London, where all pedigree stock can be detained and isolated under official veterinary supervision for a period of at least fourteen days immediately before shipment, that is to say, a period sufficient to cover the maximum period of incubation of foot and mouth disease with a sufficient margin. The station contains 28 boxes and 18 pens, and the maximum accommodation is therefore about 50 cattle or 70 sheep and pigs. The charges for care and maintenance are £3 per head for cattle and £1 for sheep and pigs for the quarantine period of 14 days. For each separate consignment of animals from the same premises there is a fee of £2 10s. to cover the out-of-pocket expenses of the Ministry of Agriculture, including those in respect of veterinary inspection.

In choosing the site for the establishment of the station, particular care was taken to select a place so isolated as to eliminate any risk of the introduction into the station from outside sources of any infection from ordinary causes.



The station has recently been completed and was opened by Mr. Amery on 4th April. It is now available for the reception of animals, and is indeed actually in use.

Rigid conditions have been laid down by the Minister of Agriculture and Fisheries of Great Britain in an order entitled the Quarantine Stations (Regulation) Order, 1928. One of the most important provisions of the order is that no animals are qualified for admission into the station unless they come from premises in Great Britain situate outside a radius of 15 miles from any place on which foot and mouth disease or cattle plague or pleuro-pneumonia has been certified to exist during the three preceding months, and unless the animals to be exported, and all other animals on the premises from which they are brought, have been examined immediately before movement into the quarantine station by a Veterinary Inspector appointed by the Ministry of Agriculture and Fisheries, and certified by him to be free from the above-named diseases.

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**Dominion Food Production.**—An interesting article under the above caption appeared in a recent issue of *The Imperial Food Journal*, the author being Mr. R. S. Forsyth, London Manager of the New Zealand Meat Producers' Board. From what is written it is evident that Britain is keeping up her reputation as a great beef-eating nation. For instance, in spite of the heavy importation of beef amounting to over 650,000 tons per annum, Great Britain still supplies 819,900 tons, or over 55 per cent., of her own beef requirements. South America, which comprises Argentina, Uruguay and Brazil, is easily the largest supplier of imported beef to Britain, both in its chilled and frozen state. The beef supplies from this source amounted to 615,725 tons, or over 91 per cent. of the total importations of beef. This shows how greatly Great Britain has now to depend upon South America for her beef supplies.

The article goes on to show that ever since the war South America has been decreasing the shipments of frozen beef and increasing the chilled beef shipments, until in 1927 the proportion of South American beef was approximately 85 per cent. chilled and 15 per cent. frozen.

Australia was a much stronger competitor of South America in pre-war days, when the proportion of frozen against chilled beef was much greater. It is stated that the higher costs of production since the war, as well as the increased killing, transport and other charges, have made it difficult for Australia to stay in the business. The official figures of the wholesale selling price of Australian beef in London for the last two years have been approximately 4½d. per lb. It is interesting to note that nearly half of the beef exported by Australia in 1927 was shipped to other countries than Great Britain.

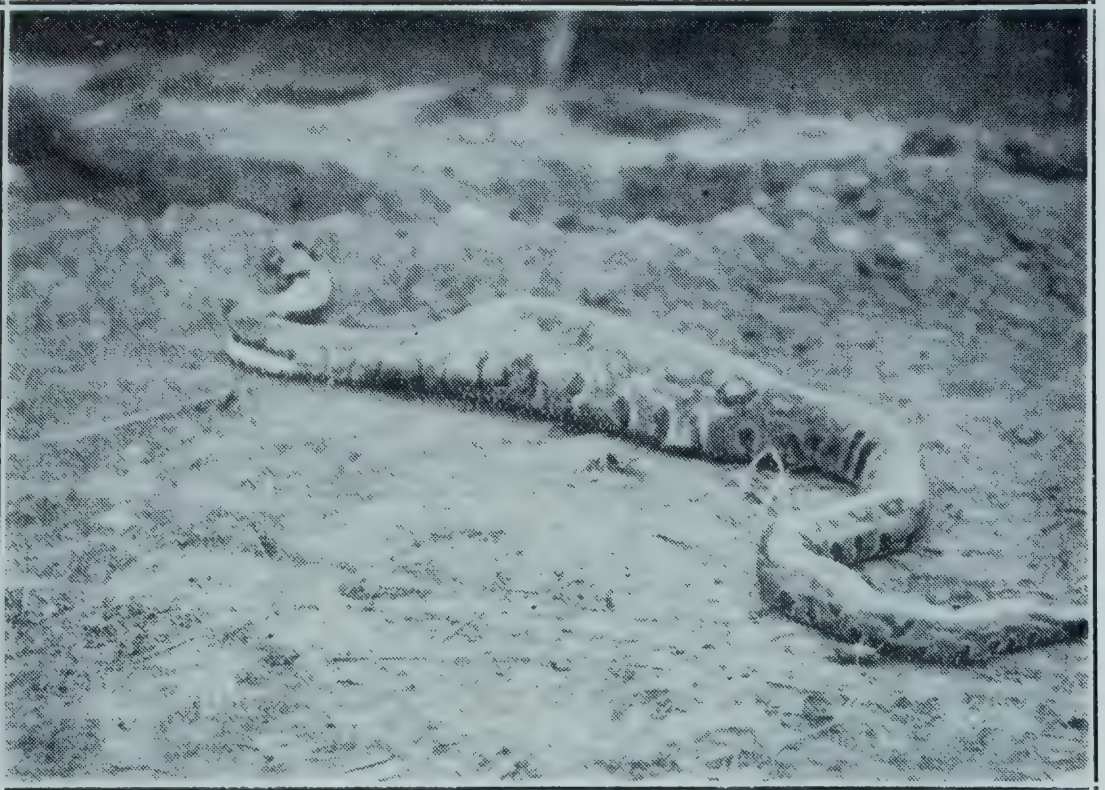
Canada, who used to be a fairly large supplier to Great Britain, chiefly in the form of live cattle, has now found a more satisfactory outlet for her fresh beef in the United States, in spite of the import duty of 1½d. per lb.

Although the consumption of beef in Great Britain is nearly three times greater than that of mutton and lamb, we note that the British Empire makes a much better showing in the supply of mutton and lamb. Britain's home supplies amount to 303,000 tons out of a total consumption of 577,964 tons, which is approximately 53 per cent.

Of the total imported supplies of mutton and lamb, amounting to 276,168 tons, New Zealand supplied 50 per cent., Australia's proportion being approximately 11 per cent., and the remaining 39 per cent. being chiefly supplied by South America. All the supplies of imported mutton and lamb are sent frozen and not chilled. The freezing process appears to have no detrimental effect upon lamb and mutton, and when defrosted it approaches very closely the condition of fresh, home-killed meat. New Zealand is steadily increasing her lamb shipments, which are now approaching the stupendous total of 6,000,000 carcasses annually. Incidentally, New Zealand obtains a premium of from 1d. to 1½d. per lb. over South America and Australia.

It is further stated that British Empire countries only supply 11.2 per cent. of the bacon imported into Great Britain, as against 88.23 from foreign countries. The figures for ham are not much more encouraging, the percentage being, British Empire, 15.79 per cent., against 83.69 per cent. from foreign countries. The imports of fresh pork were also chiefly derived from foreign sources prior to 1926,





Note.—The python was found by natives with the head of the buck in its mouth. A tug-of-war ensued between the natives and the python as to ownership, in which the python was the victor, as will be seen from the top illustration. The natives later killed the python and removed the buck, which had not a bone broken.





when, owing to foot and mouth disease on the Continent, the importation of all fresh meat from the Continent of Europe was prohibited.

In regretting the fact that a large proportion of this valuable trade is not supplied from within the Empire sources, Mr. Forsyth suggests the only remedy to be Imperial preference.

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**Agricultural Economics in the United States.**—We have received a very interesting circular from the California Agricultural Extension Service, portions of which may usefully be summarised for the information of our readers. The circular reproduces the addresses delivered at the economic conferences held in connection with the visit of the demonstration train known as the "California Agricultural Special" to twenty-four communities of the interior valleys of California during the last two weeks in March, 1928.

Dealing with post-war agricultural depression, the statement is made that the farmer's dollar is not worth as much as it used to be. To put it in another way, the farmer cannot purchase as much of other commodities with the money he receives for a unit of his product to-day as he could before the war. His purchasing power is lower. A chart reproduced with the circular shows that the purchasing power began to decline in 1919, and continued downward through 1920, reaching a low point in 1921 and 1922. Between 1922 and 1925 there was considerable recovery. There was a drop in 1926, chiefly due to the low price of cotton, but the curve is again back to the level it reached in 1925. The immediate result of this deflation of prices was that between 1919-1920 and 1924-1925 the acreage planted with wheat in California decreased by 46 per cent., that of grain sorghums by 46 per cent., corn by 43 per cent., beans by 42 per cent., rice by 39 per cent., potatoes by 35 per cent. and other crops in lesser percentages. What did the farmers in California do with their land? Many of them turned to the production of speciality crops such as fruit and vegetables. Thus we find that the total fruit acreage in the State was increased by 573,000 acres, an increase of 43 per cent.

The relatively high prices of fruit were the chief cause of this enormous increase. Growers, however, went too fast and too far, with the result that to-day the production of many fruits is in excess of demand at profitable prices.

The circular proceeds to suggest two alternatives as a remedy for existing conditions: firstly, the expansion of market outlets—which, it is stated, has promising possibilities—and, secondly, the curtailment of production. The chapter concludes with the following advice:—“However, we have not lost our optimism toward the fruit industry. Growers who have good orchards should hold on to them, provided they know their business, are favourably situated with regard to handling and marketing and are willing to adopt every reasonable method to hold down production costs and still have high yields and good quality. Such growers will undoubtedly weather the storm. But for the city speculator, the unskilled, the incompetent and the unfit no hope is offered. The sooner they realise their true position and make a change in their farming programmes, the less they will stand to lose.”

Dealing with the live stock situation, it is shown that beef cattle are in a strong position at the present time. A diagram shows the purchasing power of beef cattle in the United States and California for the past 58 years, from which it is seen that during this period the beef industry has experienced three distinct price cycles. At the present time the industry appears to be on the up-grade of a fourth cycle. The number of cattle in the United States the first of this year was the smallest since 1912 and the second smallest since 1898; both of these years representing low points in the cattle production cycle. Conditions are similar in many respects to those existing at the beginning of 1913. It is expected, therefore, that from now on the trend of production will be gradually upward for several years to come. The relatively small numbers of cattle in the country at present, together with the relatively high prices which have prevailed for several months past, are expected to provide a strong incentive for cattlemen to re-stock farms and ranges and increase their herds. In order to take advantage of fairly high levels of prices, it is suggested that plans should be made to market contemplated increases within the



next three years. The warning is given, however, that it should not be expected that present prices will continue indefinitely. A radical increase, it is considered, would undoubtedly bring prices again to the unprofitable levels prevailing between 1920 and 1926. With only a moderate increase, however, it is probable that they can be sold at profitable prices. It is thought that the present is a favourable time to increase the quality of beef by better breeding.

In conclusion, the following sound advice is offered:—  
“The Californian cattlemen might well take advantage of the high prices now prevailing to wipe out debts incurred during the lean years and put their business on a safe and sound basis, rather than to use returns to increase inventories greatly.”

**Poultry and Eggs.**—The Imperial Economic Committee have recently issued their sixth report dealing with the marketing and preparing for market of poultry and eggs. Earlier reports have dealt with meat, fruit, dairy produce and fish, and we have at various times made references to them in the pages of this Journal. We now turn to the present report, which, like its predecessors, is a comprehensive and thorough survey of the subject in hand, and the conclusions arrived at must naturally carry great weight.

After reporting on meat, dairy produce, fruit and fish, each of which is a staple article of diet, it might appear that the Committee have turned to a subject of minor interest in preparing a report on eggs and poultry. Such an assumption would, however, be based on a misapprehension. Widespread as is poultry keeping, the magnitude of the trade in eggs and table poultry is often overlooked.

The report reveals the fact that although the United Kingdom produces nearly half the eggs which it consumes, no less a sum than £19,000,000 was spent in 1925 on imported eggs and £2,250,000 on imported poultry from all sources, Empire and foreign. Taken together, these payments were one-fifth of the expenditure in that year on imported meat and one-third of that on all imported dairy produce. The hen may rank among the humblest of farm stock, but it is a striking fact that in 1925, and again in 1926, the import

trade in poultry products into the United Kingdom surpassed in value that of all the exports of motor cars, motor cycles, cycles and rubber tyres.

The United Kingdom requires annually somewhere about 5,700,000,000 eggs. Out of every 1,000 eggs utilised in 1925, 540 were of Empire origin, of which number 433 were produced in the United Kingdom; of the 460 eggs obtained from foreign sources, 138 came from China and 121 from Denmark.

The share of the Empire overseas in the supply of eggs and poultry to the United Kingdom is but small compared with the imports of foreign countries. About 20 per cent. of the imports of eggs and 31 per cent. of those of poultry come from the Irish Free State, but all the other parts of the Empire contribute only 3 per cent. of the eggs imported and 2 per cent. of the table poultry. Apropos of this, the report states:—"It is evident, therefore, that there is room for voluntary preference on the part of consumers in the United Kingdom in favour of Empire eggs and poultry."

Referring to the position occupied by poultry keeping in the economy of the farm in the United Kingdom, it is stated that in the published costings of thirteen East Anglian farms for each of the years 1923 to 1926, poultry is the only branch of live stock which has never shown a loss on any farm in any year.

Passing on to the conclusions of the Committee, we find that the United Kingdom paid £21,500,000 in 1926 for imported eggs and poultry, of which £3,680,000 was paid to the Irish Free State and about £700,000 to other portions of the Empire. Only about 53 per cent. of the eggs consumed in the United Kingdom are supplied from the Empire--Home and overseas.

The Committee considers that it should be possible to secure a larger share of this market by increased production in the British Isles and by supplementing this local production, at least during the winter months, by Empire produce from the Dominions in the Southern Hemisphere.

It is stated that a definite preference exists in the United Kingdom for Home produced eggs and table poultry, and although the foreign imports are still below the pre-war



quantities, yet the quality of the foreign produce on the British market is improving and is beginning to compete with the better rather than the worse produce of the United Kingdom.

The Committee suggests that the Empire Marketing Board should consider the advisability of preparing a survey of the scientific work in progress at the numerous centres of investigation in the British Empire, and, should such a survey show the need for a centre for the collection of information on the scientific and economic work on poultry, the consideration of the selection of some such centre is commended to the Governments of the Empire.

Finally the Committee come to the definite conclusion that the poultry industries of the Empire are capable of considerable profitable development, but that such development will only be secured by the wide application of accepted grades and standards. Thus it is for each Government to consider whether and to what extent legislation is necessary to this end, and is feasible in the circumstances of each country to ensure observance of such grades. The Committee considers that unless marketing is organised on modern commercial lines much of the benefit which should result from improvements in the breeding and management of poultry will be lost.

## The Importance of Research on Pasture Improvement in Southern Rhodesia.

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By A. D. HUSBAND, A.I.C., Chief Chemist, Department of Agriculture, Salisbury.

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The main feed supply to cattle in Southern Rhodesia is furnished by the natural pastures on the veld, and yet on almost every farm throughout the Colony little or no attention is paid by farmers to the maintenance or improvement of the grasses on their farms. The fact that their milk and meat supply, the energy for ploughing and cultivating their arable land and in many cases a monthly cheque from the creamery are produced from these grasses seems to be frequently overlooked. Many progressive farmers who spend large sums annually on fertilisers and who pay a considerable amount of attention to the maintenance of the fertility and the cultivation of their arable land never consider the economic return that might be obtained from a little consideration of their veld grasses. Unfortunately, it appears to be too generally considered that grassland requires little or no attention. This is a great mistake, for although grassland will stand an incredible amount of abuse and still produce a type of herbage, the grass produced under such conditions may be considerably altered in its composition and feeding value to stock.

Until comparatively recent years the problem of the conservation and improvement of pastures had received very little attention except from scientific agriculturists, but during the last few years the importance of this subject has become more fully realised, and investigatory work with far-reaching economic results has already been carried out in Great Britain and other parts of the world. The difficulty



in the procuring and the relatively high cost of concentrated feeds for farm animals make the problem of pasture improvement of great importance and practical interest to every stock and dairy farmer in Southern Rhodesia. It is not sufficient to pay attention merely to the quantity factor as regards grass, for the quality factors such as palatability, digestibility and nutritive value are equally as important for the successful raising and maintenance of stock as the quantity factor.

Attention has been paid by agriculturists in the past to the manurial requirements of soils mainly with a view to determining the most efficient and economical methods of supplying plant foods to the soil in order to increase crop production and to maintain soil fertility. Recent research, however, has indicated that our previous views on this subject have been too limited, and that manuring should be regarded not only in the light of its power of increasing crop production, but also in the light of the fact that profitable stock rearing is closely related to the chemical composition of the soil, in that vegetation to some extent reflects in its mineral composition the soil on which it is grown. This point is of particular importance in the case of grassland for the reason that grass without any supplements frequently forms the sole food supply of the animal. The importance of an adequate protein, carbohydrate and fat supply in the diet of the animal has long been recognised, and the nutritive value of a ration is usually estimated according to these organic constituents. It is now recognised, however, that the basing of the value of a ration on its organic constituents alone is not sufficient, and in order to assure the maximum utilisation of the organic constituents of a foodstuff by the animal and the maintenance of health, attention must also be paid to the inorganic or mineral portion of the ration.

It might quite reasonably be thought that grass, which is the natural food of herbivorous animals, should contain all the essential elements required for their proper nutrition. It has been found, however, that it is possible for animals to suffer from diseases, definitely associated with mineral deficiencies in the diet, when grazing on natural pastures. This is not surprising when one considers that the mineral composition of the plant may vary with the nature of the soil and the stage of maturity of the plant. It has been clearly shown by experimental work that mineral deficiencies

in the soil may be reflected in the plant and again reflected in the grazing animal. In no country possibly has the effect of a mineral deficiency in the soil shown more striking results in the grazing animal than in South Africa.

The work of Sir Arnold Theiler and his colleagues, on "Lamziekte," which at one time was very prevalent in certain districts in South Africa, and which manifested itself by cattle developing a depraved appetite, causing them to chew and eat various objects, showed that the indirect cause of this disease was due to a deficiency of phosphorus in the pasture grasses. These workers were able to prove that the simple feeding of a phosphorus-rich compound such as bone meal resulted in the cessation of the depraved appetite, more rapid growth of young stock, superior fattening of mature cattle and increased milk yield of cows.

Many other cases are recorded in the literature of nutritional diseases in horses, cattle and sheep, having been caused either by mineral deficiencies or by improper ratios of the minerals in natural pastures.

In considering therefore the suitability of a foodstuff, it is essential that attention be paid to the inorganic as well as the organic constituents of the food. This, as will be shown later, is particularly of importance in the case of the lactating or growing animal, as the demand for minerals is much greater in the case of these than in the adult animal.

**Foods.**—As previously stated, most farmers are aware of the importance of the protein, starch and fat supply to the animal, and one of the objects of this article is to draw attention to the importance of the minerals in animal nutrition.

The materials for the growth of the body, the repair of waste, and the production of energy have all to be obtained from the food, and it is necessary, therefore, for the ration of the animal to contain all the materials out of which the body is made. It is not sufficient for the ration merely to contain a sufficiency of available energy, as many substances such as water, salt, lime, phosphorus and potash, although bringing no energy to the body, are necessary for the repair of waste and the formation of new bone and tissue, and are just as truly foods as protein, starch and fat.



**Food Requirements of Animals.**—The requirements of animals for the different food ingredients vary according to the rate of growth of the animal, and the work it has to perform. In the case of the pregnant or lactating animal food is also required to supply the materials for the development of the foetus and the supply of milk.

As regards the organic constituents of foodstuffs certain standards, based on actual experimental feeding trials, have been laid down as to the requirements of different types of animals for maintenance and production. It is possible, therefore, from these standards to gauge approximately the requirements of different animals under different conditions for protein, fat and carbohydrate.

With the minerals, however, we have no such standards and the gauging of the correct proportion and ratio of the mineral elements in the ration is much more difficult and indefinite than the gauging of the organic substances.

**Guides as to the Mineral Requirements of Animals.**—At the present time it appears that our most reliable guides as to the mineral requirements of young, growing animals are (1) the composition of the milk of the species, and (2) the composition of the whole body of the animal at different ages and its average rate of growth.

Abderhalden, a German scientist, has shown that there is a direct correlation between the rate of growth of the animals and the composition of the milk of the species, and it will be seen from his table that the correlation extends to the total ash, lime and phosphorus as well as to the protein. The more rapid the growth of the animal, the richer is the milk in all of these materials which are required for constructive purposes.

Species	No. of days in which the new-born animal doubles its weight	Milk of the species contains			
		Protein per cent.	Ash per cent.	Lime (CaO) per cent.	Phosphoric oxide (P <sub>2</sub> O <sub>5</sub> ) per cent.
Man ...	180	1.6	0.25	0.049	0.056
Horse ...	60	2.0	0.38	0.114	0.121
Cow ...	47	3.5	0.72	0.161	0.189
Goat ...	22	4.3	0.81	0.191	0.219
Sheep ...	15	6.5	0.89	0.277	0.269
Pig ...	14	6.7	1.03	0.395	0.357

A further instance showing the relationship of the minerals in the milk to the animal has been given by Bunge, another German scientist. From his table it will be seen that there is a very close agreement between the composition of the ash of the milk and the ash of the young animal for which the milk serves as food.

				Composition of ash of rabbit 14 days old	Milk
Potash (K <sub>2</sub> O) ...	...	...	...	10.8	10.1
Soda (Na <sub>2</sub> O) ...	...	...	...	6.0	7.9
Lime (CaO) ...	...	...	...	35.0	35.7
Magnesia (MgO) ...	...	...	...	2.2	2.2
Ferric oxide (Fe <sub>2</sub> O <sub>3</sub> ) ...	...	...	...	0.23	0.08
Phosphoric oxide (P <sub>2</sub> O <sub>5</sub> ) ...	...	...	...	41.9	39.9
Chlorine ...	...	...	...	4.9	5.4

Requirements calculated on either of these bases are naturally for the young, growing animal, which, in addition to its maintenance requirements, needs these constituents for the formation of bone and muscle. In the adult fattening animal the requirements are probably much smaller, though none the less essential, as the animal has only to find these materials to replace wastage. In the case of the pregnant or lactating animal, however, the mineral



requirements are again considerably in excess of those of the adult fattening animal.

It must be remembered that during the period of gestation the animal has to find the constructive materials for the formation of the foetus, and later, during lactation, has to make good the losses from the body due to the secretion of milk.

It will be readily understood from the above that a foodstuff which may be adequate for the requirements of an adult fattening animal may be inadequate for the growing or lactating animal. The desire of the present day stock breeder and dairy farmer to evolve animals capable of a rapid rate of growth and high yields of milk has accentuated the necessity of attention being paid not only to the quantity but also to the quality factors of farm foodstuffs, in order that the health and productive capacity of the animals may be maintained.

This applies not only to concentrated farm foods, but also to pasture grasses. A type of herbage which may meet the requirements of slow growing or mature animals may be totally inadequate for rapid growing and high producing animals.

**The Feeding Value of Grasses.**—It has been shown by numerous experiments in other countries that the feeding values of grasses, as determined both by chemical analysis and feeding trials on animals, may vary considerably according to the stage of maturity of the grass, and the treatment, grazing, manurial or mechanical, accorded to the land.

Recent work by Woodman and his co-workers at Cambridge has shown that under a system of close grazing, pasture grass may attain a feeding value which compares favourably with that of linseed cake and is far superior to meadow hay of the best quality. The great practical value of this finding is that besides the greater digestibility of such grasses they also have a much narrower nutritive ratio (*i.e.*, the proportion of albuminoids to starches is much greater), and hence their value is much greater to growing or milk producing animals than the older and more fibrous grasses. It also means that the feed can be supplemented by starchy foods such as maize and other cereals instead of

the more expensive albuminoid concentrates. These workers were also able to demonstrate that the closely grazed grass was very little inferior at the end of the grazing season to what it was at the beginning.

This is a point of great interest and importance to stock breeders in Southern Rhodesia and would indicate that a system of paddocking coupled with rotational grazing would probably be a great advantage over the present system of ranging practised on nearly all farms over the Colony.

**Manurial Treatment of Pastures.**—A considerable amount of work on the improvement of pastures by use of artificial fertilisers has been carried out in different parts of the world, mainly, however, with a view of increasing the bulk of herbage and the carrying capacity of the land for stock. More recent work has shown that fertilisation may not only increase the bulk of herbage, but may change considerably the type of herbage and also its chemical composition. This latter point is of great importance, inasmuch as it may be possible to correct deficiencies in the soil and plant by proper fertilisation, thereby increasing greatly the feeding value of the herbage.

It may be of interest here to quote the results of an experiment carried out at the Salisbury Agricultural Experiment Station last season. This experiment was intended to be purely of a preliminary nature for the information of the writer, but it is considered that the results, although needing confirmation by more extensive work, are of sufficient interest to be mentioned in this article.

The object of this trial was to determine whether the application of a fertiliser containing the whole three essential manurial ingredients would exercise any immediate effect on the protein and mineral composition of the growing grass. The information was desired in order to assist in drawing up a plan for pasture improvement by fertilisation which it is hoped to carry out on a fairly extensive scale, partly financed by a grant which will probably be made available by the Empire Marketing Board.

By the courtesy of the Chief Agriculturist an acre and a half of land on the Salisbury Agricultural Experiment Station was fenced off and sub-divided into six quarter-acre plots.



Two plots were treated with fertiliser at the following rate per acre:—

1 cwt. sulphate of ammonia.

1 cwt. high grade superphosphate 19.5 per cent.

$\frac{1}{3}$  cwt. muriate of potash.

On two further plots a fertiliser at the same rate per acre of the same percentage composition was applied, but the nitrogen was given in the form of nitrate of soda instead of sulphate of ammonia.

The remaining two plots were kept as controls.

The fertiliser dressings were applied on the 24th December, 1927, and one plot only in each group was harrowed immediately after.

The plots were examined from time to time and within a month the fertilised plots showed up favourably against the controls. The harrowed plots were much behind the others; this was due to the harrowing being too severe. Later the plot which had received the fertiliser containing the sulphate of ammonia appeared a deeper green than the other plots and showed a denser and more vigorous growth. The nitrate of soda plot was also greatly in advance of the control.

The grasses were sampled on the 8th February for chemical analysis and on the 9th February cattle were turned on to the plots to graze. On the 16th February all plots were mowed, and those that had previously received an application of fertiliser were supplied with a second application of the same amount of nitrogenous fertiliser, but no phosphate or potash. Unfortunately after this second application of fertiliser no rain fell for 18 days. In spite of this, however, the second growth of grass on the experimental plots was greatly in excess of the amount on the control plots:

The plots were sampled a second time on the 3rd April.

The following table shows the composition of the grasses from the different plots as determined by chemical analysis, and also, as a comparison, the average results obtained from the analysis of twenty-four different samples taken from cultivated pastures in Great Britain.

## PERCENTAGE COMPOSITION OF THE AIR-DRIED GRASSES ON UNHARROWED PLOTS.

		Moisture	Acid-soluble ash.	Ether extract	Fibre	Protein (N x 6.25)	Lime (CaO)	Phosphorus (P <sub>2</sub> O <sub>5</sub> )	Chlorine (Cl)	Potash (K <sub>2</sub> O)	Soda (Na <sub>2</sub> O)
Fertilised with nitrate of soda, potash and superphosphate	First cutting 8-2-28...	8.395	4.436	2.296	27.318	5.70	0.469	0.452	0.291	1.888	0.146
	Second cutting 3-4-28...	7.785	4.195	2.290	28.260	7.34	0.518	0.298	0.291	1.791	0.087
Fertilised with sulphate of ammonia, potash and superphosphate	First cutting 8-2-28...	9.320	3.483	2.048	28.564	5.32	0.406	0.535	0.284	1.800	0.355
	Second cutting 3-4-28...	7.805	3.771	2.458	28.838	8.34	0.504	0.270	0.296	1.711	0.044
Control ; no fertiliser	First cutting 8-2-28...	8.007	3.220	2.100	26.260	5.30	0.523	0.405	0.280	1.637	0.079
	Second cutting 3-4-28...	7.445	2.437	2.242	27.064	5.79	0.560	0.298	0.222	1.028	0.087
Average for 24 cultivated pastures in Great Britain *	Calculated on 100 per cent. dry matter	0.00	6.637	—	23.00	17.69	1.004	0.735	0.950	3.177	0.246

\* W. Godden, *J. Agric. Sci.*, xvi. 81.



The figures in the above table show that while no great difference in the protein content between the fertilised and unfertilised plots was obtained in the first cutting, there was an increase over the control plot in the protein content of the second cutting of nearly 27 per cent. in the case of the plot receiving nitrate of soda and 44 per cent. in the plot receiving sulphate of ammonia.

The influence of the fertilisation on the mineral content of the grasses is most marked in the case of the potash. It will be seen from the figures for this mineral that the fertilised plots in the second cutting of grass show an increase over the control plot of 74.2 per cent. in the one case and 66.4 per cent. in the other. With regard to the phosphorus, it will be noted that only in the first cutting is the content of the grass increased in this mineral. The reason for this is not clear and will need further investigation. It has been previously stated that the composition of grass varies to a certain extent according to its stage of maturity. Once past a certain stage of growth, grasses not only tend to become unpalatable to stock, but their feeding value is considerably diminished owing to the decrease in the protein and ash content and the increase in indigestible fibre. With the exception of the early part of the rainy season, therefore, it is probable that the feeding value of our grasses is much lower than the above analytical data would indicate.

A study of the composition of the grasses from the plots used in the above experiment, compared with the figures given for cultivated pastures in Great Britain, will show the great differences that exist between the protein and mineral composition of the two types of grasses. It will be noted that the protein content of the cultivated pastures is over three times that of the mixed grasses taken from the control plots on the Salisbury Agricultural Experiment Station and also that the mineral content of the grasses shows an almost corresponding difference.

This comparison throws a certain amount of light on the problem as to why imported pedigree cattle do not maintain their productive capacity on entrance to the Colony and also as to the reason for the falling off in the rate of growth of the progeny of such cattle after weaning unless carefully nurtured on albuminoid concentrates. It is well known that

the capacity of cattle is limited to a certain quantity of dry matter per day, and it will be readily understood that young cattle of high producing strains cannot maintain their efficiency as producers when grazing on grasses containing only one-third of the materials required for constructive and productive purposes, as the grasses on which the high producing species have been evolved.

It may be thought by many farmers that it will not be an economic proposition to apply fertilisers to grassland. It should be remembered that this same opinion was held by many a few years ago in connection with maize lands. To-day, however, there are but few farmers in the Colony who have not come to realise that manurial treatment for maize and other arable crops is an essential and paying proposition. To what degree the grasses on our natural pastures can be improved by paddocking, rotational grazing and fertilisation has yet to be determined, but from the information recorded above it appears obvious that by a proper system of management and manurial treatment it should be possible considerably to improve their feeding value.

The object of this article is not an endeavour to persuade farmers to spend large sums in fertilisers in order to improve their grazing land, but is an effort to stimulate interest on the part of producers as to the value of their pastures. It is also desired to draw attention to the possibilities of pasture investigations and to the fact that research work on pasture problems will be commenced in the near future, with the object of obtaining information as to the best and most economical methods of conserving and improving the grasses on the farm.

It is believed by the writer that work on these problems may throw considerable light upon many of the troubles in connection with stock rearing prevalent in Southern Rhodesia to-day.

*[Note.—Acknowledgment is made to Mr. A. P. Taylor, M.A., B.Sc., for the analysis of the samples of grass, and to Mr. R. McChlery, B.A., B.Sc., and Mr. Arnold for carrying out the practical work in connection with the experiment.]*



## Suggested Cropping Programmes for Farms on the Sand Veld.

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By D. E. McLOUGHLIN, Assistant Agriculturist.

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As a result of the present tobacco position many enquiries have been received by this Department for a cropping programme for the forthcoming season, and in response thereto the following suggestions are put forward with a view to assisting sand veld farmers, and new settlers in particular, to plan their arable farming operations for the next year or so.

A number of applications have been made for loans with which to purchase dairy and other improved stock without due regard to the necessity of first having ample supplies of the foodstuffs required for such animals, and, infinitely worse, in not a few cases, without having any feed other than veld grazing available on the farm. It is essential to have the necessary feeding stuffs in sight before buying dairy cows or pigs or whatever the stock may be.

In each of the following proposed schemes of cropping it is assumed that a certain amount of veld hay can be made. Too much emphasis cannot be laid on this item, for no farmer can afford to be without adequate supplies of natural hay.

In drawing up the different programmes, it has been thought that the farmer who grows tobacco in addition to other crops will find it more advantageous to plant maize on land which has previously grown one or more crops of tobacco with fertiliser, and that he can best mainly utilise newly cleared land for the next tobacco crop. The reason for this is that tobacco is known to do well on new land stumped and ploughed comparatively late in the season, whereas maize under similar conditions seldom yields a profitable return. The crops here suggested are additional to tobacco.

Land which has grown two consecutive crops of tobacco with fertiliser should not require any additional fertiliser for the following crop this season. Land which has grown only one crop of tobacco with fertiliser can, with advantage, receive 150 lbs. of bone and superphosphate per acre when planted to maize this year.

Sunflower following one crop of tobacco with fertiliser will generally not need any additional fertiliser, but a light dressing to ground nuts will often be found profitable.

It must be remembered that any light land which has grown two or three successive crops such as tobacco and/or maize, and/or nuts, will be in need of humus at the end of that period. Additional land should, therefore, be cleared and brought under the plough every year, until such time as sufficient is available to permit of a definite system of rotation, which will include the ploughing under of green manure crops every fourth or fifth year, as well as the application of a certain amount of farm or kraal manure.

The best results from ground nuts may be expected from the Spanish or Virginia bunch varieties, and if this crop is spaced not more than 24 inches apart between the rows, and 6 inches apart in the rows, profitable returns should be obtainable. The native runner variety should be avoided; it is often planted because seed is cheaper and easily bartered from the reserves.

The spacing for sunflower is the same as that for maize (36 x 18 inches or 40 x 18 inches), the seed usually being dropped considerably closer in the rows and the plants thinned out to the distance stated when 8 to 12 inches high.

Velvet beans grown together with maize for grain can be sown by hand equidistant between the maize plants and in the same row. In place of velvet beans either dolichos beans or kaffir beans can be used. In each case the seed is best sown 3 to 4 weeks after the maize has been planted, or when the latter crop is 12 to 18 inches high. On the sand veld generally, and in areas where the crop is known to succeed, cowpeas (kaffir beans) are preferable, because the low growth of the crop competes less against the growth of the maize.

The cowpea also provides more grazing, or humus for ploughing under, since a greater proportion of the plant is



on the ground than is the case with climbing beans, such as velvet and dolichos beans. In the case of cowpeas the seed can be broadcasted between the rows of maize just before the last cultivation and covered in with the cultivator. With this crop, the first ripened beans can be used for seed, and the remainder of the crop can be utilised for grazing or can be ploughed under to add humus to the soil.

Mid-December to early January is considered a suitable time for planting pumpkins or majordas. By that time the maize field should be free of weeds. If necessary, the land may be hand cultivated up to such time as the growth of pumpkins or majordas renders further interference inadvisable. The spacing for both those crops may be about 9 feet by 8 feet.

Sweet potato cuttings should be planted early in the season. It is more economical to purchase a few sacks of tubers and to plant these in a nursery bed. Cuttings can then be taken from the nursery bed and planted out into the fields when weather permits. Cuttings should be planted 36 inches by 18 inches apart. The Calabash leaf variety has, so far, proved the most suitable as a stock feed.

So far as may be found possible with the labour available, the planting of the maize crop by hand is strongly recommended. The "hills" or holes can be prepared and the fertiliser or farm manure applied before the rains, in exactly the same manner as for tobacco. If the maize is check-rowed 36 inches by 36 inches apart, 4 to 5 seeds should be planted to each hole, and two plants may be left growing in each hole, the weaker ones being pulled out when 6 to 10 inches high. The holes being prepared, the seed is planted at the usual date after sufficient rains have fallen. Ten boys should hand-plant 25 to 30 acres of maize a day. When only small amounts of farm or kraal manure are available, a double handful applied to each hole should give a good return, and the limited supply can thus be used over a much larger acreage. A similar bulk of scrap tobacco reinforced with 200 lbs. per acre of superphosphates should also give good results.

Hand-planting of maize is an insurance for a good stand and a maximum yield.

“Any ” seed should not be “ good enough.” The best seed is the cheapest when it comes to harvesting the crop. As there will be a possible shortage of good seed of all the crops referred to in this article, it is advisable to book orders with reputable growers or suppliers at an early date.

### Number 1.

#### 70-ACRE PROPOSITION (A).

##### Crop and Treatment.

Acres.

- |    |   |
|----|---|
| 50 | <b>Maize</b> —with 200 lbs. bone and superphosphate per acre.                 |
| 10 | <b>Sunflower</b> —if possible with 200 lbs. bone and superphosphate per acre. |
| 10 | <b>Ground Nuts</b> —with 200 lbs. superphosphate per acre.                    |

#### 70-ACRE PROPOSITION (B).

(Combining Dairying, Pigs and Poultry.)

##### Crop and Treatment.

- |    |   |
|----|---|
| 30 | <b>Maize</b> —with 200 lbs. bone and superphosphate per acre.   |
| 10 | <b>Maize</b> —with 6 to 8 tons kraal manure per acre, or fertiliser as above, underplanted with pumpkins and/or majordas. |
| 10 | <b>Maize plus Velvet Beans</b> —if possible with 200 lbs. bone and superphosphate per acre (for grain and dry fodder).    |
| 5  | <b>Maize plus Velvet Beans</b> —if possible with 200 lbs. bone and superphosphate (for silage).                           |
| 5  | <b>Ground Nuts</b> —with 200 lbs. superphosphate per acre (tops harvested for hay).                                       |
| 5  | <b>Sunflower</b> —if possible with 200 lbs. bone and superphosphate per acre.   |
| 5  | <b>Sweet Potatoes</b> —(Calabash leaf).   |
|    | <b>Veld Hay.</b>  |



**Number 2.****100-ACRE PROPOSITION (A).****Crop and Treatment.**

Acres.

- 70 **Maize**—with 200 lbs. bone and superphosphate per acre.
- 15 **Sunflower**—if possible with 200 lbs. bone and superphosphate per acre.
- 15 **Ground Nuts**—with 200 lbs. superphosphate per acre.

**Veld Hay.****100-ACRE PROPOSITION (B).**

(Combining Dairying, Pigs and Poultry.)

**Crop and Treatment.**

- 50 **Maize**—with 200 lbs. bone and superphosphate per acre.
- 10 **Maize plus Velvet Beans**—if possible with 200 lbs. bone and superphosphate per acre (for grain and dry fodder).
- 10 **Maize plus Pumpkins and Majordas underplanted**—if possible with 6 to 8 tons kraal manure per acre or fertiliser.
- 10 **Sunflower**—if possible with 200 lbs. bone and superphosphate per acre.
- 10 **Ground Nuts**—with 200 lbs. superphosphate per acre.
- 5 **Maize plus Velvet Beans**—if possible with 200 lbs. bone and superphosphate per acre (for silage).
- 5 **Sweet Potatoes**—(Calabash leaf).

**Veld Hay.**

**Number 3.****130-ACRE PROPOSITION (A).****Crop and Treatment.**

Acres.

- 90    **Maize**—with 200 lbs. bone and superphosphate per acre.
- 20    **Sunflower**—if possible with 200 lbs. bone and superphosphate per acre.
- 20    **Ground Nuts**—with 200 lbs. superphosphate per acre.

**Veld Hay.****130-ACRE PROPOSITION (B).**

(Combining Dairying, Pigs and Poultry.)

**Crop and Treatment.**

- 65    **Maize**—with 200 lbs. bone and superphosphate per acre.
- 10    **Maize plus Velvet Beans**—if possible with 200 lbs. bone and superphosphate per acre (for grain and dry fodder).
- 10    **Maize plus Pumpkins and Majordas underplanted**—if possible with 6 to 8 tons kraal manure per acre or fertiliser.
- 10    **Maize plus Velvet Beans**—if possible with 200 lbs. bone and superphosphate per acre (for silage).
- 15    **Sunflower**—if possible with 200 lbs. bone and superphosphate per acre.
- 15    **Ground Nuts**—with 200 lbs. superphosphate per acre.
- 5    **Sweet Potatoes**—(Calabash leaf).

**Veld Hay.**



## Precautionary Measures against Tobacco Diseases.

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By J. C. F. HOPKINS, B.Sc. (Lond.), A.I.C.T.A. (Trinidad),  
Government Mycologist.

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The seed bed season is approaching and now is the time to start taking precautionary measures against the diseases which we know can be prevented by simple methods. "CLEAN SEED BEDS—CLEAN CROP" is a slogan which should be adopted by all tobacco growers, and every effort ought to be made this year to increase the yield per acre by eliminating diseases. Two dry years may be followed by a wet season, and under these climatic conditions wildfire, for instance, may well live up to its name and reputation. (It should not be forgotten that instances of complete destruction of a crop in a few days by wildfire are not unknown in this Colony, even in a dry season.) Full details have already been described in this Journal (1) of methods of seed treatment for the elimination of bacterial diseases, whilst the necessity for burning the soil and the way to do it have also been published (1 and 2). This article is therefore written to call the attention of all farmers to the necessity of establishing an anti-disease routine for their seed beds.

Investigation during the past year upon the distribution and dissemination of certain diseases has shown that the most common way in which bacterial diseases, particularly wildfire, are carried from crop to crop is on the seed. It would appear from the evidence collected that all farmers do not take sufficient care in keeping treated seed away from every source of infection. It is suspected that infected bags are sometimes used to store treated seed, and it is probable that seed which is sent away for treatment frequently comes in contact with infected tobacco material after having been disinfected. It must be remembered that the post office and railway authorities do not undertake to provide aseptic accommodation in the transport of tobacco seed!

Further work carried out in the Mycology Laboratory has shown that the corrosive sublimate method of seed treatment is satisfactory, and the most practicable known for farmers themselves to carry out. It is therefore urged that every grower should TREAT HIS OWN SEED not sooner than a few weeks before sowing, and should take every care to see that the seed is stored in disinfected clean bags in a place entirely free from *any* tobacco refuse.

The distribution of wildfire and angular spot is very general throughout the Colony, and this article is definitely written as a warning against the use of untreated or improperly treated seed.

*Keep your seed upon the farm and supervise the entire handling of it yourself.*

The use of the corrosive sublimate seed steeps on every farm should occasion no difficulty, as the materials required are few. Thus—a bottle of corrosive sublimate tablets; a wooden, glazed earthenware or enamelled iron bowl (unprotected metal must *not* be used); a bucket; a muslin or fine cheese-cloth bag; a piece of stick; and a yard or two of limbo to make a drying frame.

Corrosive sublimate is cheap, and the remainder of the material will be found on every farm.

The question of the preliminary cleaning in order to remove light seeds and pieces of tobacco trash is not so easily solved, since the blower (2) which is used may cost some pounds, but cannot farmers' associations arrange for the erection of one or two of these little machines at convenient centres, for the use of members? And would not the members be quite agreeable to pay a small sum for the privilege of using these blowers?

Further reference to this important subject will be made in the next issue of this Journal.

#### REFERENCES.

1. Hopkins, J. C. F.—“The Care of Tobacco Seed Beds.” *Rhodesia Agricultural Journal*, July, August and September, 1927; reprinted as Bulletin No. 653.
2. Brown, D. D.—“Tobacco Seeds Beds.” *Rhodesia Agricultural Journal*, September, 1926; reprinted as Bulletin No. 607.



## A Farmers' Calendar of Crop Sowings.

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By C. MAINWARING, Agriculturist.

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*(Owing to the constant enquiry for information regarding crop sowings, the following calendar which appeared in the "Rhodesia Agricultural Journal" of December, 1925, is reprinted.—Ed.)*

The aim in issuing this sowing calendar is to provide farmers, and more especially new settlers, with guidance as to general sowing operations on the farm. The season largely determines the dates of planting, but it is hoped that this calendar will be suggestive to the beginner, to whom any fixed points or standard of whatever kind are valuable in enabling him to plan his work. The farmer long accustomed to a locality depends less on a calendar than on the general state of the weather and the "signs" of the season.

Rainfall and climatic conditions vary so much in different districts of the Colony that it is not possible to fix arbitrary dates of seeding. In regions of light rainfall special attention should be given to the preparation of the seed bed. Almost all crops thrive better when drilled than when broadcasted, since the seed, being planted at a uniform depth, germinates more evenly, and cultivation is rendered easier. Farmers are advised to use home-grown selected seed wherever possible, and to change their seed only for the purpose of getting a better variety of known value or a better strain. The Department of Agriculture desires to urge upon the attention of farmers the great necessity of using none but pure well-cleaned seed true to the variety required. Especially should a guarantee be required that all seeds purchased are free from noxious weeds as wild oats, darnel and so forth. Good seed is a determining factor in the production of maximum yields.

## JANUARY.

## Crops to Sow.

*Maize, Ground Nuts, Sunflowers and Kaffir Corn*, with the expectation of obtaining good yields, can only be planted with safety at an altitude below 4,000 ft.

*Maize for Silage*.—25 lbs. per acre drilled in rows.

*Milletts or Manna*.—For forage; also provides grain useful for poultry. Sow 15 to 20 lbs. broadcast. Popular variety, Boer Manna.

*Potatoes*.—Main crop.

*Sweet Potatoes*.—Plant cuttings largely in rows 3 ft. by 2 ft. A popular variety, Calabash Leaf.

*Beans, Haricot*.—40 lbs. per acre, in rows 2 ft. by 8 ins. Varieties, Red Canadian Wonder and Natal Sugar.

*Beans, Velvet*.—For hay or green manure, 25-30 lbs. per acre, rows 3 ft. by 10 ins.

*Beans, Kaffir, or Cow Peas*.—For hay or green manure, 30 lbs. per acre, in rows 2 ft. by 8 ins.

*Buckwheat*.—30 to 40 lbs. per acre, broadcast. Variety, Japanese.

*Linseed*.—For stock feed, 25 lbs. drilled, 30 lbs. broadcast per acre.

*Oats*.—For hay or forage, 60 lbs. per acre drilled, 70 lbs. broadcast. Varieties, Kherson or Kinvarra.

*Oats*.—For grazing. Sow broadcast in maize crop during last cultivation, 60 lbs. per acre.

*Teff Grass*.—For hay, 6 to 8 lbs. per acre broadcast.

*Peas (Field)*.—60 to 70 lbs. per acre, sown in rows 2 ft. by 4 ins. Best summer variety, Black-eyed Susan.

*Vegetables for Garden*.—French beans, lettuce, carrots, onions, parsnips, spinach. Cabbage and cauliflower in seed beds for transplanting.

*Cultivation*.—As weather permits and as opportunity occurs, cultivate the growing crops.

*Planting*.—Wind breaks and trees for shelter and shade where necessary.



## FEBRUARY.

## Crops to Sow.

Late planting of haricot beans, linseed, teff and buckwheat can be made.

*Onions* that are intended to be grown under irrigation should be sown in the seed beds, and transplanted when the size of a thin lead pencil. 2 lbs. of seed will plant an acre. Varieties, Natal Red and Yellow Cape.

*Haymaking*.—As the weather permits, the whole resources of the farm should be concentrated on haymaking, which should be commenced while the grasses are in flower.

The cultivators should be kept going between the rows of growing crops to eradicate weeds and conserve moisture. In the case of maize, care should be taken gradually to decrease the depth at which the tines run, as the roots near the surface may be injured.

Clearing and breaking up of new land for next season's crops should, where necessary, be undertaken.

Fire breaks around veld intended for winter grazing and along wind breaks and plantations may be ploughed.

*Vegetables*.—For garden. Transplant cabbages and cauliflowers that have been raised in seed beds. Make a further sowing of cabbages and cauliflower, also peas (marrowfat), carrots, beets and parsnips.

## MARCH.

## Crops to Sow.

*Lucerne*.—Under irrigation, 20 lbs. per acre broadcast or 15 lbs. drilled. Variety, Provence.

*Peas (Marrowfat)*.—Under irrigation, 70 lbs. per acre. in rows 2 ft. by 4 ins. Variety, Yorkshire Hero.

*Barley*.—For green fodder for dairy cows. Sow under irrigation or in moisture-retaining vleis if land can be got into condition. 70 to 80 lbs. of seed drilled or broadcast. Variety, Cape six-rowed or Barley Wheat.

*Onions*.—Under irrigation. A further sowing can be made.

*Vegetables.*—For garden. Sow cabbage, cauliflower, turnip, beet, lettuce and peas; continue to transplant cabbages and cauliflower.

Weather permitting, haymaking and cutting grass for bedding should be pushed forward.

New land should be got ready for next planting season by ploughing and discing to check weeds and evaporation.

*Machinery.*—Planters and cultivators not in use should be cleaned and stored away under cover, duplicates for worn out parts being obtained when necessary.

Preparations should be begun for making silage next month. New pits should be made and old pits cleaned out.

## APRIL.

### Crops to Sow.

Under irrigation make final sowings of lucerne and commercial crops of peas and onions.

*Barley.*—For green fodder, sow to keep up supply for dairy cattle.

*Oats.*—For winter pasture, if moisture vleis can be got into condition. Drill or broadcast, 70 to 80 lbs. per acre. Popular varieties, Kherson and Boer Oats.

*Wheat.*—Land should be prepared for wheat. The first sowing of late varieties can be made towards the end of the month.

*Onions.*—Transplant from seed beds to permanent position.

*Vegetables.*—For garden. Transplant cabbage, cauliflower and onions. Sow turnips, kale, peas and beet.

*Crops for Silage.*—The best time to cut maize for silage is when the grain is in the dough stage. The stem is then green and sappy, but the outer portions of the leaves from the cob downwards have turned colour.

If not already attended to, orders for grain bags, wool packs for cotton, twine and so forth should be placed.



## MAY.

## Crops to Sow.

*Wheat*.—Sow main crop under irrigation, or on moist vlei soil, 50 to 60 lbs. per acre.

*Oats*.—Main crop. Irrigated or on moist vlei soil. Sow 60 to 70 lbs. per acre. Varieties, Kherson, Boer Oats and Algerian.

*Barley*.—For malting or grain for pig food. Irrigated or on moist vlei soil. Sow 60 to 70 lbs. per acre. Variety, Cape six-rowed.

*Barley*.—Make further sowings for green fodder, also rye for the same purpose. Sow 60 to 70 lbs. per acre.

*Onions*.—Last transplants from seed beds.

*Vegetables*.—For garden. Transplant kale, cabbage and cauliflower. Sow marrowfat peas; broad beans as required.

If the weather is settled, brickmaking may be started.

Now is a good time to re-thatch sheds and outbuildings, and to begin the hundred and one little jobs that have been left until a slack period.

## JUNE.

## Crops to Sow.

*Oats and Barley*.—For green forage.

*Vegetables*.—For garden. Sow beet, carrots, onions and lettuce.

The earliest November planted maize will be ripening off. Reaping may commence toward the end of the month. Threshing floors should be prepared. If the veld is dry enough, burn fire breaks that were ploughed in the month of February.

*Brickmaking* may be continued. It is always well to have a supply of well burnt bricks on hand for repair or extension of buildings.

## JULY.

## Crops to Sow.

This is not a good month for sowing any farm crops.

*Vegetable Garden*.—Transplant onions, sow peas, lettuce, carrots, parsnips, beet. Sow a little tomato seed under cover.

Prepare moist vlei soil or land under irrigation for early crop of potatoes. When available, prepare moist vlei soil for early crops of maize. Burn fire breaks if not done previous month. Commence to plough up old maize lands that have been harvested.

### AUGUST.

#### Crops to Sow.

*Potatoes* may be planted in frost-free situations under irrigation or in sandy moist vlei soil, 1,000 to 1,200 lbs. per acre, according to size of seed. Tubers planted in rows 2 ft. 4 ins. by 1 ft.

*Maize* on moist sand vleis. Plant an early-maturing variety, 12 lbs. to the acre. Varieties recommended, Early Botman or Cango (flints) or Iowa Silver Mine (dent).

*Vegetables*.—Sow French beans and tomatoes in sheltered spot; also sow parsley, carrots, beet and lettuce.

Continue to plough up old maize and cotton lands as fast as they are reaped and the stalks eaten down, and the refuse collected and burned. Sow tree seeds in tins or beds for planting wind breaks, shade and shelter during next rainy season. If not already done, plans for the coming season's cropping should be considered. Thought should be given to the seed which will be required, and the placing of orders for fertilisers to be bought should receive attention.

### SEPTEMBER.

#### Crops to Sow.

*Potatoes*.—Under irrigation.

*Vegetables*.—French beans, carrots, capsicums, leeks, melons, pumpkins, vegetable marrows, rhubarb, spinach, tomato and potatoes.

Continue to get old land ready for November planting. Cross-plough new lands broken up during February and March. Transplant tree seedlings into half petrol tins, 25 in a tin.

### OCTOBER.

#### Crops to Sow.

*Potatoes*.—Under irrigation.



*Vegetables.*—For garden. Sow asparagus, French beans, cucumber, egg plant, tomato, pumpkins, vegetable marrow, beet, carrots, onions, leeks, lettuce and spinach.

Get the lands ready for planting maize and other long maturing crops by ploughing, cross-ploughing, discing and harrowing, to reduce the soil to a fine tilth and to conserve moisture.

## NOVEMBER.

### Crops to Sow.

*Maize.*—If soaking rains have fallen by the middle of the month, plant maize in rows about 40 ins. by 18 ins. Varieties, Hickory King, 15 lbs.; Salisbury White, 12 lbs.; and Potchefstroom Pearl, 12 lbs. per acre.

*Kaffir Corn.*—Plant in the same way as maize. Sow 5 lbs. per acre, 40 ins. by 10 ins. Varieties, Birdproof and White Sudan. Kaffir corn is drought resistant and thrives best on loamy soils.

*Sunflower.*—Plant 8 to 10 lbs. per acre in rows same as maize, and thin out during dull wet weather when the plants are 6 ins. high to 15 or 18 ins. apart.

*Velvet Beans.*—For seed or green manuring. Sow 25 lbs. per acre in rows 3 ft. by 10 ins. Variety, White Stingless.

*Dolichos Beans.*—For seed or green manuring. 20 lbs. per acre in rows 3 ft. by 10 ins. Varieties, Brown or White seeded.

*Dhal.*—Plant 6 to 8 lbs. per acre in rows 3 ft. by 2 ft. apart in frost-free situation—matures grain in six months.

*Chillies.*—Sow in beds and transplant during showery weather into rows 2 ft. 6 ins. apart. Variety, Small Cayenne.

*Pumpkins and Cattle Melons.*—For winter stock food. Plant 4 lbs. of seed per acre, 8 ft. by 8 ft. between plants.

*Potatoes.*—Main crops will be planted from now until January, depending on the sprouting of the seed tubers. Plant 1,000-1,200 lbs. seed per acre according to size, in drills approximately 36 ins. by 15 ins. apart.

*Vegetables.*—For garden. Cucumber, vegetable marrow, French beans, tomato, lettuce, beet, carrots, onions, parsley, spinach and parsnips.

This and next month are the busiest planting months, when sowing operations should be pushed on with vigour and as rapidly as the weather permits.

## DECEMBER.

### Crops to Sow.

Continue to plant maize, kaffir corn, sunflower, velvet beans and dolichos beans.

*Maize*.—For ensilage. Plant 25 lbs. per acre in rows.

*Maize and Velvet Beans and Maize and Dolichos Beans* in combination for ensilage or grain. Plant 15 lbs. of beans in rows 3 ft. by 18 ins., followed at the same time with 15 lbs. of maize in the same rows, to allow for easy cultivation.

*Pumpkins and Cattle Melons*.—For winter stock food.

*Sweet Potatoes*.—Plant cuttings for succulent winter food in rows 3 ft. by 2 ft. A popular variety, Calabash leaf.

*Sudan Grass*.—For hay. Sow broadcast 20 lbs. per acre. Succeeds best with light rainfall; very drought resistant.

*Ground Nuts*.—30 lbs. of shelled nuts per acre, in rows as near as will allow for easy cultivation. Varieties, Spanish or Virginia bunch.

*Sunn Hemp*.—For green manuring, 30 lbs. per acre, drilled or broadcast. Plough under during flowering stage.

*Beans, Velvet or Dolichos*.—For hay. Plant 20 lbs. per acre in rows 3 ft. by 10 ins.

*Beans, Kaffir (or Cowpeas)*.—For seed, green manure or hay. Plant 30 lbs. per acre in rows 2 ft. by 8 ins.

*Peas (Field)*.—60 to 70 lbs. per acre. Sow in rows 2 ft. by 4 ins. Summer variety, Black-eyed Susan.

*Teff*.—For hay. 6 to 8 lbs. per acre broadcast.

*Vegetables*.—For garden. French beans, carrots, beet, parsnips, onions, leeks, spinach, capsicums, potatoes, lettuce, vegetable marrows and cucumber.

Keep crops growing in rows free from weeds by constant cultivation.



# Wood-Charcoal in Southern Rhodesia.

By T. L. WILKINSON, B.Sc., Assistant Forest Officer.

**Introduction.**—In June, 1912, an article entitled, "Some Notes on Charcoal Burning," by Dr. E. A. Nobbs, Director of Agriculture, appeared in this Journal. As this article has been out of print for some time, and as requests are continually being received from the public for information on the subject, it has been thought advisable to compile some fresh notes.

**Uses of Charcoal.**—The uses to which wood-charcoal is put are numerous, the chief being as a source of cheap power for running suction gas engines, smelting ores, and smithy work; as a smokeless fuel and in the manufacture of explosives. Due to its absorptive powers, it is largely used for decolourising and deodorising in chemical work, and for metallurgical work. Again, it is utilised in making insulators, since it is a poor conductor of heat and electricity. It has medicinal properties aiding digestion, and thus in a crushed form is useful for poultry and animals.

**Properties.**—Wood has for its chief constituents carbohydrate cellulose and lignin, both of which are rich in carbon. When heated to high temperatures without free admission of air these organic substances are decomposed, giving off gases, a residue of impure carbon remaining behind. This residuum is called charcoal, and consists almost entirely of carbon mixed with a certain amount of undecomposed carbon compounds and inorganic matter which are constituents of the wood. Carbon 70-85 per cent., hydrogen 1.5-2.5 per cent., oxygen 6-12 per cent., hydroscopic water 4-12 per cent., ashes (mineral matter) 1-2.5 per cent., are the percentage amounts of the elements to be found in charcoal.

Good charcoal is deep black in colour, with a steel blue metallic sheen and an oily lustre. It is lustrous on the transverse surface and does not change on keeping. If it is a brownish red, carbonisation is incomplete. If it is soft, dull coloured, or loses its colour on keeping, either the wood was unsound or the wood was over-burned.

The texture is distinct, the grain of the wood appearing in the charcoal. It breaks with a conchoidal fracture when broken transversely; when broken into pieces it shows but few cracks. The use of unsound wood causes it to lose its texture. If damp wood is used or if the billets are too large the charcoal will crack. It is strong and firm, emits a metallic sound when pieces are struck together, and does not soil the hands when touched, and is not easily crushed. The use of unsound wood or over-burning the wood causes the charcoal to be dull in colour and sound, soft and dirty to the touch. It has no taste. It kindles at 680 deg. F. (360 deg. C.), glowing slowly, burning with a short, blue flame, emitting no smoke, odour or sparks and not crackling. If it is not thoroughly carbonised the flame becomes longer and whiter, and it has a less calorific value. It is highly absorptive of gases, absorbing thirty-five times its volume of carbon dioxide and ninety times its volume of ammonia gas. It is a deodorising agent, and is thus antiseptic. It prevents a mouldy scent forming and hinders decomposition of organic matter. It is immensely durable. It has a density varying with the wood from which it is prepared and a specific gravity about .20 (.15-.30). Its specific weight is lower the higher the temperature at which it is burnt. It shrinks 10-20 per cent. in length and 20 per cent. in girth (conifers), 25 per cent. in girth (broad-leaf trees). It takes up 5-12 per cent. of atmospheric moisture being hygroscopic, and absorbs 25-30 per cent. of its weight when watered. It has a higher heating value the heavier the charcoal and the heavier the wood from which it is made. Its calorific intensity is generally between 6,500 and 8,000 calories. Schwackhofer states: "Though the volume is less than that of the wood used in making it, only being 40-60 per cent. of it, the heating power bulk for bulk or weight for weight is far greater."



**Rhodesian Woods suitable for Charcoal.**—These timbers have not been investigated as yet scientifically, but charcoal has been successfully made from a number enumerated below, while others are worthy of a trial, since they indicate that they will give satisfactory results. Almost any indigenous or exotic species may be used. The minor details of their conversion vary with the species. If the conversion process, however, only one species should be used in the kiln at one time. The wood should be sound and dry (not dead), since by using this type of wood the resultant yield and qualities of the product are increased. The following list will indicate some of the timbers indigenous to Southern Rhodesia which will make good quality charcoal when correctly converted:—

- \**Acacia Karoo* (*horrida*)—Sweet thorn.
- \**Burkea africana*—Syringa, Mukarati, Mnondo.
- \**Baikaiea plurijuga*—Rhodesian teak, Redwood, Igusi, Mkusi, umKusu.
- \**Berlinia globiflora*—Mtondo, Mnondo.
- \**Brachystegia Randii*—Msasa.
- \**Protea* sp.—Sugar bush, Mubonda.
- \**Monotes glaber*—Mushawa, Muwara.
- \**Uapaca Kirkiana*—Mushonshi, Muzharzhi, Mahobohobo, Mujanje, Mutshenji, Mushuku.
- \**Faurea saligna*—Beukenhout, mPemberi, umRere, Mtsatsati, Musesetu, isi Dwadwa, Gurahorgwe.
- \**Eugenia owariensis*—Waterboom, Mukute, Murquí.
- \**Terminalia sericea*—Mandwge, Mukonono, Mangwe, Mahonono.
- \**Terminalia Brownii*—Mususu.
- \**Pterocarpus sericeus*—Mumblungu, Mumungu.
- \**Kirkia acuminata*—mTuva, mVumela, Mushamina.
- \**Diospyros mespiliformis*—Mushuma.
- \**Combretum Petersii*—Hartekol, mChenalota, mChiri, Mutchili, Muyando.
- \**Combretum* sp.—Mufomberi, mFula, mKosikasi.
- \**Faurea speciosus*—Umjanbatsi, Mtsatsati.
- \**Rhus lancea*—Karee, mBoncha.
- \**Copaifera coleosperma*—Rhodesian Mahogany, mChibi, Muzaoli, Mnzauri.
- \**Gleditschia africana*—Musheshe, m'Senye.

\**Afromosia angolensis*—mChiwhanga, Muwanga.

*Pterocarpus erinaceus*—Mukwa, Mukurambira, Muboangazi, umVagasi, umVamoropu.

*Brachystegia tamarindeoides*—muButcha, Munzi, Munza, Gusi.

*Brachystegia appendiculata*—Mountain Acacia, Gondi, umtlahla, mTweyo.

*Afzelia cuanzensis*—Pod mahogany, mKamba.

\**Copaifera mopane* (small pieces)—Mopane, Mupani, Ipane.

\**Parinarium mobola* (short pieces, inclined to break)—Muhatcha, Mahash, mChakata, mCha, mKunu, Mucha, Moura, Mumbhuni.

And many other indigenous species yet to be tested. To the above may be added the sticks of the introduced black wattle (*Acacia mollissima*), all the introduced eucalypts (gums) and conifers (cypresses, pines, callitris, etc.).

*Note.*—\* indicates woods from which charcoal has been made successfully in Southern Rhodesia.

**Manufacture of Wood-Charcoal.**—This is the dry distillation of wood by carbonising it under partial or total exclusion of air.

It is carried out to obtain as a result—

- (a) charcoal as the chief product, or
- (b) charcoal as a bye-product.

(a) Carbonisation takes place with partial exclusion of the air and with direct application of fire, either in

- (1) pits, or
- (2) kilns or stacks built of pieces of wood,

covered with brushwood or grass, then by earth. In this conversion there is always partial combustion, hence there is a certain loss.

(b) Is carried out in retorts with all the air excluded and with indirect firing.

**Processes used in the Manufacture.**—The processes used are classified as follows:—



(i.) Pit.

(ii.) Kiln (temporary)—

(a) Beehive, dome, paraboloidal or vertical.

(b) Horizontal, prismoidal or rectangular.

(iii.) Kilns (permanent)—

(a) Brick.

(b) Iron.

(c) Retorts (large for destructive distillation).

It is not intended in this article to describe (i.), which is of but little use, as being too inefficient and wasteful, but to discuss (ii.) (a), (ii.) (b) in their modified forms, which are well suited for this Colony, at some length. Items (iii.) (a), (iii.) (b) and (iii.) (c) are only referred to above as they involve a certain outlay of capital which is only desirable when the product is to be manufactured on a large scale or the other products derivable from destructive distillation are to be collected, among these being acetic acid, acetone, methyl alcohol, wood tar.

**Shape and Dimension of Wood used.**—The size and shape of the billets has a considerable influence on the resultant yield, since all parts of the kiln do not burn at the same rate. The billets should be as uniform in size as possible for any one kiln, except in case (ii.) (b), which will be described under that head.

The billets should not exceed 6 feet in length; the shorter the pieces, the easier it is to shape the kiln, hence the less the cost of construction. Billets of 3 inches in diameter are very suitable, though much smaller billets may be used. If the billets exceed 6 inches in diameter, it is as well to split them into quarters.

All billets should be trimmed and cleaned in order that they may be stacked as compactly as possible, since by this means the kiln is more readily prevented from collapsing during the burning process. The wood should be as straight as possible, any interstices caused by crooked pieces being closely packed with smaller pieces. Each kiln should only contain one species of wood.

**Kilns.**—No difficulty exists in manufacturing charcoal in kilns. The initial outlay is small, and the amount of skilled labour required is not very great.

The methods described below have been evolved to suit conditions in this Colony, and can advantageously be followed with slight alterations here and there as experience and locality may deem advisable for better results.

In operating these kilns the following tools will be required: Picks, shovels, axes, sickles, screens (sieves) and a grindstone.

This method, which has been employed in Rhodesia in the past, is a simple one and very economical, quite suitable for areas where water is unobtainable and the wood, owing to transport and other difficulties, has to be burnt in close proximity to where it is cut. The soil may be of a sandy or tighter nature, and neither sods nor water are essential. All the work can be done by coloured labour.

The shape of the kiln is a paraboloid, and varies in height and diameter. A small kiln is advisable for initial attempts, although this is necessarily more costly to erect and manipulate in proportion to the yield. Nevertheless, it is less of a loss if some misfortune should occur through lack of experience. A kiln 12 feet in diameter and 5 to 8 feet in height might advantageously be used at first. This will hold from two and a half to five cords of wood, yielding on an average 1,200 lbs. of charcoal (1,000-2,200 lbs.).

A method of determining the volume of the kiln if the amount of wood is not known is  $\frac{d^2\pi}{4} \times \frac{h}{2}$  where  $d$  = diameter of kiln in feet,  $h$  = height of kiln in feet,  $\pi = 3.14$ , or perhaps the same, only easier to measure, is  $\frac{g^2 h}{25.13}$  where  $g$  = girth (in feet) of kiln,  $h$  = height (in feet) of kiln, 5 per cent. being deducted from volume, since the kiln is not a true paraboloid.

**Site of Kiln.**—For the best results the ground should be level, sheltered from winds, near water if possible, and situated on the felling area or close to it, but where only a little clearing is needed in preparing the site.



Since the nature of the ground beneath the kiln has a considerable influence on the resultant product, a site should be chosen where the soil is uniform underneath the kiln. A sandy loam is the best soil, as this allows a moderate amount of air to enter the kiln, while it absorbs whatever moisture may be emitted. Other soils may well be used, but a loose, porous soil admits too much air, causing the burning to become too rapid and producing heating charcoal. This is partially overcome by having fewer ventilators open in the kiln. A heavy soil causes slow burning and produces a cold charcoal; this can be remedied partially by having more ventilators open in the kiln.

The ground should be cleared of all sticks, roots and stones, which will cause unequal heating. It is advisable to remove the soil covering and any stones in the soil near the surface. If the site is not level, it should be levelled. To mark out the site, drive a stake in in the centre of the future site and describe a circle of the required size about it. If the soil is very heavy, it may be desirable to slope the ground slightly away from the centre to create a better draught and facilitate the run-off of liquids emitted. If the site is very wet, it is best to burn some wood on it prior to erecting the kiln in order to dry the ground. A new site is always inferior to an old site, and a loss of 5 per cent. or more in volume may be expected. The charcoal dust resulting from an old kiln, if mixed with the soil, gives it the right degree of porosity. Hence it is better to use an old site than a new one when kilns are burnt at a later date.

The illustrations accompanying this article do not show the site as having been cleared, but better results are obtained by clearing.

The trees, after being felled, are chopped into billets approximately 5 feet long, and stacks are built conveniently around the site of the proposed kiln. Stacks may be made in cords, but unless some special object is to be gained thereby, such as payment by piece labour, this course is not necessary. A convenient size of stack for billets 5 feet long is about 5 feet 6 inches high by about 10 to 11 feet long. Such a stack should take two boys one day to cut and build, and will be sufficient to fill a kiln yielding 1,600 lbs. of charcoal.

**Erection of Kiln.**—Drive a stake into the central point of the future kiln, and build around this some brushwood and twigs with which the fire is to be started (see illustration). Next, make flues on the ground by placing two spars 8 to 12 inches in diameter near together (8 inches to 12 inches apart) and parallel, bridging across the top with short pieces of thin wood, thus forming a kindling flue 8 inches to 12 inches square. These flues are 6 or more feet in length, depending on the diameter of the kiln, and radiate from the central point. They are set in the line of the prevailing wind, two or four according to the size of the kiln. There is no vertical flue or chimney in this type of kiln.

To construct the kiln, pile round the central brushwood and over the flues billets standing nearly upright with a slight lean to the centre and stacked compactly. The billets standing over the flues should be slightly shorter than the others, in order to make the top surface of the lower tier as level as possible. Pack all the interstices with small pieces of wood. If any billets have been split, place the split sides inwards. The larger billets should be placed nearest the centre of the kiln. Carry on this construction outwards from the centre, and when some progress has been made with the lower tier commence the upper tier in a like manner; proceed with the stacking of the two tiers until the length of the horizontal flue spars is almost reached, leaving about one foot projecting. When the wood has been stacked as compactly and vertically as possible, fill all the crevices with small wood, in order to prevent too great a draught and to prevent the cover from collapsing. The slope of the billets should be as steep as the angle of repose of the covering material will permit.

In larger kilns it is often advisable to fill in the top of the kiln with smaller billets placed horizontally or very obliquely.

Prior to covering the kiln, round the outside of the pile of wood should be placed a number of short lengths of wood 18 inches long and 4 inches thick, these being set radially one every 18 inches or 2 feet; on these brushwood is laid, reaching through the outer covering. This arrangement permits air to enter the kiln at the bottom, thus aiding burning. If the fire becomes too fierce, some of this space should





Charcoal burning. Preparing the stack.



Charcoal burning. Stacking the timber.







Charcoal burning.







be covered over; in fact, by means of these vents the burning can be controlled—covering if burning is progressing too rapidly, opening if progressing too slowly.

**Covering the Kiln.**—This is essential, in order to make the kiln air-tight and fire-proof; it is done by placing on the stack two coverings. The inner covering is made by thatching the stack of wood with grass (dry or green) or ferns, twigs and leaves, moss, etc., to a thickness which will support the outer covering—usually 3 to 4 inches will suffice. The outer covering is piled to a thickness of 9 inches or so, or in the rainy season 12 inches over the inner covering and patted down smoothly. This covering should be of sand or earth and made as steep as possible for the reason that it is less liable to cave in than if flat.

**Kindling and Burning.**—The kiln is now ready for kindling, which is done by introducing a torch on the end of a long pole through one of the flues to the brushwood at the centre. A kiln of 11 to 12 feet in diameter should be set alight on a still morning before or about daybreak. The emergence of a thick, flocky smoke indicates that burning has commenced. When carbonisation sets in, this changes to a bluish, clear vapour with a pungent odour.

The normal course of carbonisation is from the top of the kiln downwards and outwards in an expanding, inverted cone. This course is rarely normal, due to a greater draught from one direction or the kiln not being exactly symmetrical.

To keep the burning as normal as possible, the fire is led to the base by means of vents opened or closed below the line of fire. The bottom vents already mentioned will usually suffice in the small kiln recommended, but in larger kilns other vents must be made and closed higher up in the kiln as burning proceeds. When flames protrude from the bottom of the kiln all vents must be closed, since carbonisation is now complete.

An additional means of regulating the burning is by removing a layer of the outer cover in the place where burning is too slow, or by adding fresh earth where the burning is too rapid. Throughout the burning and cooling the kiln must be carefully watched to see that no cracks or hollows occur, as this will cause the kiln to cave in and the whole

to burst into flames, thus wasting the charcoal and destroying the kiln. All cracks should be promptly covered and all hollows filled.

When a depression is noticed in the cover of the kiln, wood should be placed handy, and the extent of the hollow tested by tapping. The cover of the part concerned should be removed rapidly and wood pressed in to fill the space, the hole being quickly re-covered and beaten firm. All vents should be closed before any hollow is filled, and should not be opened for some time afterwards. By careful initial stacking as much filling as possible should be obviated, since it is necessarily a costly and wasteful process, but an indispensable one.

As mentioned above, careful attention is necessary throughout the operation of charcoal-making, which for the small kiln described will be from eight to twelve hours for burning and one to two days for cooling down. Larger kilns take proportionately longer. The time of the complete operation is calculated roughly at one day per cord. As stated above, when burning is complete, the kiln is sealed up, this being the initial stage of cooling down. To accelerate the cooling down the kiln may be watered, should water be available; if not, fresh earth or sand can be thrown on the kiln.

**Removal of the Charcoal.**—The practice in Rhodesia is to allow the kiln to cool down for two weeks to a month, when it is made to collapse by prodding. This, however, is not recommended, since it means a longer period of watching, while the yield of the resultant product is decreased.

Good quality charcoal should not remain longer than necessary in the glow of the kiln. It should be removed gradually so as not to set the kiln on fire. The operation is best commenced in the evening and continued throughout the night, when any fire may be more readily seen. The method is to open the kiln on the leeward side and rake out the charcoal with a long pole, ceasing operations and filling the hole in the kiln where any signs of fire are seen. Continue around the kiln until it is empty. The charcoal set aside on removal should be watered, if water is available; if water is not available, it should be watched and covered with earth if there are any signs of the charcoal bursting



into flame. When all the charcoal has been removed, it should be sieved in order to separate it from the sand and smaller pieces. A convenient sieve is one made of strong iron wire, with meshes of not more than  $\frac{3}{4}$  inch, and in size 4 feet by 10 feet, fitted with handles. The cleaned charcoal is set aside on a clean piece of ground ready for bagging and weighing. The ashes and charcoal dust should be left on the kiln site to form a bed for any future kilns. The small pieces can be bagged separately, since their uses are not the same as for the larger pieces. Mixing tends to depreciate the value of the latter. The yield obtained is on an average roughly 16 bags of 80 lbs. from the two or three cords of wood used.

The time occupied by the above method can be stated roughly as follows per cord:—

Cutting and stacking ... ..	6 hours
Preparation and construction of kiln ...	6 hours
Burning and watching ... ..	24 hours
Removal of charcoal, bagging, sewing and weighing ... ..	12 hours
<hr/>	
Total time per cord ... ..	48 hours

For the kiln recommended above the labour should be divided as follows:—

*Cutting Wood and Stacking.*—Two natives can cut one stack 5 feet by 5 feet 6 inches by 11 feet in a day (*i.e.*, 300 cubic feet or  $2\frac{1}{2}$  cords approximately).

*Preparation and Construction of Kiln.*—Two natives can build a kiln in one day.

*Burning (Watching).*—One native can attend to a kiln or two natives to four kilns of the above size, taking three days to burn and cool off.

*Opening and Screening.*—Two natives can do a kiln in half a day, or better at night.

*Bagging and Sewing.*—Two natives can bag and sew up the contents of a kiln containing approximately 16 bags of 80 lbs. in four hours.

On the basis of labour at 8d. per diem and food at 4d. per diem, the costs should be in the vicinity of—

	s.	d.
Labour ... ..	10	0
One kiln of 16 bags, each bag used six times at 8d. per bag ... ..	1	9
Value of wood (including brushwood)— Brushwood and $2\frac{1}{2}$ cords at 2s. per cord	5	0
Tools, sundries and supervision ... ..	2	0
<hr/>		
16 bags of 80 lbs. ... ..	19	9
<i>i.e.</i> , 1s. $2\frac{1}{2}$ d. per bag.		

Transport on railway, say  $3\frac{1}{2}$ d.=1s. 6d. per bag.

All the above costs will be greatly reduced for larger kilns, as the only additional costs will be the bags. The wood is not really chargeable, for if it was not used for this purpose it would have been destroyed.

### Cape Flats Method.

Another almost similar method to the one described above is that employed by the Forestry Service at the Cape Flats, in the Union of South Africa, and may well be employed in Rhodesia. There it is recommended that there be only one tier of billets, 4 feet in length.

In construction two or three pieces of wood 2 feet long are placed in the centre to act as a flue, and kept in position by resting other billets against them. The kiln is then packed as described previously. The kiln is thatched from the bottom upwards, the drier the wood the thinner the thatching. The inner thatching is made of green leaves and twigs. The opening of the flue is as described in the Rhodesian process.

The outer covering has a wall of sand or earth 6 inches thick by 1 foot high built round the bottom of the kiln. A roof about 18 inches thick is placed on the top of the kiln.

A ring is left uncovered near the top of the kiln until it is lit to create a draught; this is covered with sand or earth when the kiln is alight. The kiln is lit as described previously. The burning is regulated by removing or adding sand or earth to the spots which are burning too rapidly or too slowly. The object of the bottom wall is to facilitate the collection of any sand or earth which may fall from the walls



of the kiln. The sand or earth can then easily be replaced on the weak spots.

The yield from such a kiln (*i.e.*, one 12 feet in diameter by 4 feet high) is approximately 734 lbs. of charcoal from 3,300 lbs. of wood.

The cost of operations is roughly as follows:—

Preparing wood and stacking ... ..	5	units of labour
Thatching and covering with sand $\frac{1}{2}$ .. ..	$\frac{1}{2}$	„ „ „
Burning (watching) ... ..	$2\frac{1}{3}$	„ „ „
Sifting and bagging ... ..	$1\frac{1}{3}$	„ „ „

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Total ... ..  $9\frac{1}{6}$  units of labour

### Horizontal Kiln.

A method which can well be used where the timber is long and straight such as in wattle or eucalypt plantations is suggested for trial. The process is in use at Fort Cunyng-hame, South Africa. It has the advantage that it does not require the use of water nor does it necessitate the logs being cut into billets.

A useful kiln is one of rectangular shape, usually about 30 feet long and 8 feet wide, but the size may be varied to suit the material used so as to obviate chopping or sawing as far as possible. It may be necessary to shape the logs to ensure close packing. Logs are not split, and there is no definite limit to their size. If the log is not completely charred, the part which is may be knocked off and the log re-charred in the next kiln.

In stacking, two rows of poles are set in the ground at about 8 feet apart, each row usually consisting of three poles. The poles stand about 8 feet high. To prevent their being pressed outwards by the stack, the top of each pole is connected by a wire to the one opposite.

A few logs about 8 feet long are laid on the ground across the site of the kiln and dry kindling wood and litter are placed between them with a view to spreading the fire evenly throughout the kiln. The kiln is built up by placing logs on these horizontally and lengthwise, layer above layer. The stacking should be as compact as possible and the re-

maining interstices should be filled with smaller pieces of wood. The height is usually about 5 feet above the ground.

A firing chamber is left in the middle of each end of the kiln about 2 feet by 2 feet and 4 feet in length. It is constructed by means of uprights and cross pieces, around which the stack is built.

The inner covering is of sods built up and over the stack. If sods are not available, green branches should be used to cover the kiln, over which loose earth is thrown to cover the kiln completely.

The two firing chambers are filled with dry kindling wood and ignited. When the surrounding wood is well alight (*i.e.*, after one to one and a half hours in the case of well-dried wood), short pieces of wood are packed tightly into the firing chambers so as to fill them. The chambers are then covered by earth or by sheet iron with earth on top. Small holes are made at intervals at various heights in the walls around the kiln to allow some draught to pass in and the steam to escape. These are closed when a bluish vapour appears. While the kiln is burning, cracks must be repaired and hollows filled in. Watching should be constant for at least the first day.

A rough rule for calculating the time required to burn the wood is one day per ton of wood used; a kiln of the above size thus requires about fourteen days. The kiln need not cool down before it is opened. The removal is started by opening one end at the top and proceeding downwards and forwards. As the charcoal is removed it is cooled down by water when available. The walls are left standing as far as possible for future use.

The quality of the charcoal is good and the return is high by this method. A kiln of the above size would contain 32,000 lbs. of wood, from which 8,000 lbs. of charcoal may be expected. Higher results may be obtained from dry wattle sticks without bark.

The cost of operations for the above kiln is roughly as follows:—



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Building the kiln ... ..	12	units of labour
Covering the kiln ... ..	12	„ „ „
Watching the kiln ... ..	12	„ „ „
Opening the kiln ... ..	12	„ „ „

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Total ... .. 48 units of labour

**General.**—Charcoal is best sold according to species; it is not advisable to mix the species in any one lot. A better market will always be found if the charcoal is graded into sizes.

Broad-leaved softwoods give a less yield by volume than conifers, but a greater yield than broad-leaved hardwoods. Split wood gives a greater yield than round wood or branch-wood. Hardwoods give a better and heavier charcoal than softwoods, but take longer to carbonise. Well-seasoned wood gives a larger return of charcoal, since it shrinks less. Dry wood or partially decayed or rotten wood should be avoided, since it gives very poor charcoal. The freer the wood is from knots and defects, the better the charcoal. The slower the process of carbonisation, the heavier the charcoal. By using large billets more wood can be stacked in the kiln, but they take longer to carbonise, and if too large cause the charcoal to crack. The best size for billets is 3 inches to 4 inches in diameter, or split billets 6 inches to 9 inches quartered.

Uniformly still weather gives the highest yields and best results. Changeable weather has a very adverse effect on the burning. The action of the wind and the temperature affects the yield very much. A high wind causes too rapid burning; a choppy wind causes uneven carbonisation.

A high temperature accelerates the burning. In large kilns wide daily variations in temperature have a very adverse effect on the quantity and quality of the charcoal. In damp, humid weather it is necessary to open the vents more than in dry or windy weather to get even carbonisation.

As the best results are obtained in dry, still weather, April to September is the best period for charcoal burning. During this time kilns can be watched day and night without much difficulty. This is also the season of least work

on the farms, hence it may be better fitted in. Care must be taken during these months to see that fires from the kiln do not ignite the veld.

Burning should be slow at first, the rate increasing later. With slow burning, heavier charcoal results and the volume produced is greater.

The length of time which it takes the kiln to carbonise depends on the size of the kiln, the size and dryness of the billets. The rate of burning is affected by the site, the arrangement of the wood, and the weather.

Permanent kilns undoubtedly give a higher yield than temporary kilns by as much as 5 per cent. or more in weight and volume. Of the temporary kilns it is questionable which type gives the best results. The type described, which kindles at the base, is claimed to give the best results, and undoubtedly does so in the temperate zones. The quantity and quality of the charcoal very much depend on the skill of the burner and his foresight in carrying out the operations.

The volume yield is in inverse proportion to the specific weight of the wood used; but the weight yield is in direct proportion to the specific weight of the wood.

Speaking generally, good charcoal has a volume equal to 50 to 60 per cent. of the wood used and a weight equal to 25 to 30 per cent. of the wood used.

In South Africa indigenous acacias yield 734 lbs. from one cord of air dry wood, or a yield by weight of 22.2 per cent. Wattle wood yields about 800 lbs. from one cord of air dry wood, or a yield by weight of 25 per cent. Rhodesian results give 600 lbs. per cord of wood or only 20 per cent. yield by weight. These low yields are due to the labour employed rather than to the wood used.

A maize bag holds 80 lbs. of charcoal.

A 25-ton bogie truck carries 550 bags approximately of 80 lbs. each.

An ox wagon carries 50 to 80 bags of 80 lbs. each.



# Witch Weed or Rooibloem

(*STRIGA LUTEA*).

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## A SERIOUS MENACE OF MAIZE.

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By J. A. T. WALTERS, B.A., F.R.S.A., Agriculturist.

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In the issue of the *Rhodesia Agricultural Journal* for April, 1916, the attention of maize farmers was drawn to the newly-discovered presence of witch weed among the maize crops in certain parts of the Mazoe Valley, and a personal visit was made by an official of the Department to the areas affected. Owing to circumstances connected with the Great War, no drastic measures were then taken by farmers to cope with the pest, which, in point of fact, was not very extensively spread, and was not causing any considerable visible damage. Mounted specimens of the weed were distributed by the Department to farmers' associations, and attention was drawn to its nefarious possibilities. These tentative warnings were not productive of much result, for during the last few years sufficiently alarming reports have been received from various parts, including the Mazoe Valley, to the effect that witch weed has made its appearance over fairly large areas, inflicting severe damage to the maize crop. A serious aspect of this occurrence is the fact that in the last few years it has spread very extensively, and is likely to spread still further, unless vigorous measures are taken to combat and exterminate it.

The witch weed is a small, erect plant, rarely exceeding twelve inches in height, with narrow, inconspicuous leaves and characteristic bright scarlet flowers, somewhat resembling the lobelia in shape and size. It is indigenous to South Africa, and may occasionally be seen on the veld, where it

rarely exceeds a few inches in height, and is generally dwarfed when compared to the vigorous specimens which occur on cultivated maize fields. The plant seeds freely; a well-grown plant may bear several hundred capsules each containing up to a hundred or more fine seeds. The magnitude of the danger from multiplication by seeds will thus be obvious.

The danger from witch weed lies in the fact that it is a parasite on plants of the grass family. This is to say, instead of feeding on food substances in the soil in the normal way, it attaches its own roots to the roots of the maize or other grass plants that may be growing nearby and draws its food supply from its host. The result in the case of maize is a markedly stunted and weakened plant, usually unable to bear a fully developed cob, and often no cob at all.

Generally, a considerable area in a maize field is affected in this way, and this area extends each year with the spread of the seeds in every direction by the agency of wind, water and cultural operations. Other crops on which it parasitises in the same way are kaffir corn, millet, teff grass, rapoko and Sudan grass. Professor Pearson, who investigated this pest in the Union of South Africa many years ago, wrote:—"A badly infested maize crop left to itself until the witch weed seeds may be sufficient to spread the pest over many square miles of ground." The danger often lies in the fact that a badly infected area is apt to be discarded and neglected as not worth the trouble of cultivation and cleaning.

A few points of great importance in connection with the life history of the witch weed may here be mentioned as having a considerable bearing upon the measures which can be used in its control.

Firstly, the seeds of the witch weed will not germinate in the soil or elsewhere unless they lie in the vicinity of the roots of a plant of the grass family (such as maize). The reason for this appears to be that the secretions from grass roots are essential as a stimulant to germination; and, however favourable these conditions may be, no germination will result without the secretion. Saunders, of Potchefstroom, estimates that the witch weed seeds must lie within approximately half an inch of the maize roots to be thus stimulated.





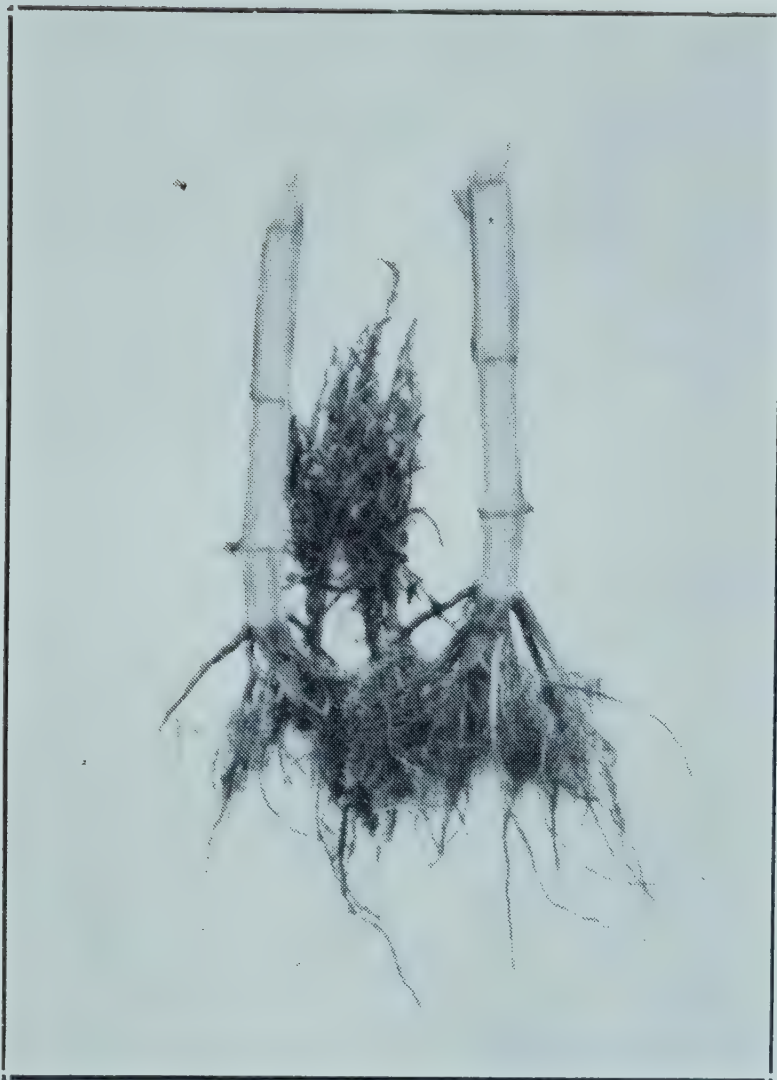
FIGURE I

FIGURE II

Witch weed or rooibloem (*striga lutea*).







Witch weed growing on the roots of maize.



Witch weed growing on the roots of maize,





If the soil is occupied only by crops such as velvet beans, sunflower, ground nuts or cotton, no germination takes place, and the plant will not make its appearance that season. The seeds, however, remain dormant in the ground, and retain their vitality, to make their baneful presence apparent whenever maize or other grass crop is sown.

Secondly, the seeds of the witch weed germinate in about a week or ten days after coming into the requisite contact with the maize or other suitable roots, and the plant appears above ground about six weeks later. It usually shows in maize fields in Rhodesia from mid-January onwards, due doubtless to the fact that the bulk of the maize crop is sown from mid-November onwards.

Thirdly, the seeds are capable of germination at a considerable depth in the presence of suitable roots, and the plant may form leaves before reaching the surface. These leaves are purplish-white in colour, becoming green when they emerge to the light. It is not certain whether the plant can actually flower and produce seed underground, but a closely related and somewhat similar plant—*Striga orobanchoides*—also occurring in the Mazoe Valley, undoubtedly does so. Specimens of this in full foliage and seed growing entirely underground were recently forwarded to the Department by Mr. T. J. Mossop, of Glendale.

From a consideration of the above facts, certain measures of defence and attack are indicated. The urgent need for early action, when the pest first appears in the maize crop, is obvious. The farmer should ever keep a watchful eye, particularly where stunted patches indicate some harmful agency, and should an early infestation be discovered in the maize lands, a determined effort should be made to eradicate every individual witch weed plant. A sharp look-out is indicated from mid-January onwards, and any discovered weeds past the early flowering stage should be handled carefully to avoid shedding the seed, and the plants, after being collected, should be burnt. Further, it is far from certain that covering the plants up by means of a wing-shovel or ridging plough is effective in eradicating the weed. Ridging may afford relief by assisting the maize plant and by partially stifling the seed, but it must not be relied on as a complete measure of eradication. The possibility of its seeding underground

must be borne in mind, and investigations on this point by individual farmers would be welcomed. Again, rotation with other crops such as legumes, sunflower or cotton mitigates the losses inflicted, inasmuch as the witch weed does not attack plants other than grasses, but the seeds remain viable in the ground for many years and will again attack a maize crop when sown, even after an interval of many years. Therefore, no permanent relief may be expected from such a course, although, doubtless, a sufficiently long abstention from any crops of the grass family might be effective.

When, however, it is realised that witch weed seeds germinate freely in the presence of maize or grass roots, it is obvious that here we have, at least, one means of coping with the pest in a fairly effective way. For if the witch weed seeds can be induced to germinate, and they and the host plant be then destroyed before the parasite seeds, we have only to repeat the process systematically to reduce the pest to almost negligible proportions, and eventually to destroy it entirely. The necessary method of inducing germination has been indicated above. A crop of maize (preferably), teff grass, rapoko or manna may be sown thickly as a catch crop over the affected area as early in the season as weather conditions permit, in October or early November if possible. Then, as soon as the weed appears above ground, or as soon as from inspection the farmer is satisfied that a copious germination has taken place, the crop should be removed or ploughed under before the witch weed flowers and sets seed. Sufficient time should, however, be allowed to enable the maize roots to reach the deeper lying seeds. In this way a considerable proportion of the weed seeds will have been destroyed. Another of the above crops may then be sown the same season, and if germination of witch weed seeds again result, the crop should again be removed or ploughed under, the same precautions being taken against seeding. If the infestation has been very heavy, an early trap crop the following season may be advisable, and hand-hoeing over the affected area may be necessary.

The objection to such a drastic course is the expense involved and the loss of cropping over one or more seasons. But some such loss is inevitable in eradicating the pest once it has obtained a firm hold. The scheme may be modified



and the loss reduced by growing a leguminous crop such as ground nuts after the first trap crop or by utilising the second maize crop for ensilage, but nothing would be more expensive than allowing the pest to run its course unchecked.

It is not suggested that there may not be other less costly methods of combating or repressing this pest, and such are now the subject of investigation by this Department. It is possible that covering the witch weed plant systematically by means of ridging may so repress its activity that successful crops can be grown in spite of it. Or again, the action of dense shade such as that provided by undersown crops of cowpeas or velvet beans may reduce its seeding powers, or further—and this seems a more promising course—bringing the soil into a certain state of fertility by incorporating humus or fertiliser, may produce conditions inimical to its continued existence.

The factors favouring or hindering the growth and spread of witch weed are at present very imperfectly understood. Nor is it known exactly in what way the weed so injuriously affects the maize plant, and no hopes are at present entertained of the discovery of an easy and infallible method of eradicating it. But it should ever be borne in mind by farmers that witch weed is potentially a source of great loss and danger, being all the more insidious in that its comparative insignificance and late appearing habit may render it immune to the ordinary cultural operations.

## The Benthall Ground-Nut (Pea-Nut) Picker in Southern Rhodesia.

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One of these has recently been introduced into Southern Rhodesia by the London and Rhodesian Mining and Land Company, and has been successfully operated on the company's agricultural estates in the vicinity of Gatooma. The general manager of the company, Mr. Digby Burnett, has been kind enough to supply the following particulars regarding the working of the machine, and this information will, we are sure, be of great interest to those of our readers who are growers of ground nuts.

Unfortunately the picker is a somewhat expensive outfit apart from the requisite power plant required to operate it. The price landed in Rhodesia, quoted by the agents, Messrs. G. North and Sons, Pretoria (who now have an agency in Salisbury), is £260 for the 13 ft. size and £290 for the 16 ft. model. This is more than the majority of ground-nut growers could afford, and it is obvious that machines of this kind would best be bought and operated on a co-operative system amongst neighbouring growers, or by a private contractor who would travel the machine from farm to farm within a given area in the same way that maize shelling is often effected.

We hope there may be those in the country who can take this matter up on the lines indicated, for it is certain that ground-nut growing in this Colony will make no substantial progress until labour-saving devices for separating the nuts from the vines come into common use. The London and Rhodesian Mining and Land Company has conferred a benefit on the farming community by its action in introducing and demonstrating this machine in Southern Rhodesia.

The machine is truly a "picker," and not a thresher or harvester. The vines are fed to the machine in the same manner as grain in the straw is fed to a threshing machine, and by a system of endless bar construction the vines are





Ground-nut picker being driven by tractor at the Gatooma section of the Mining, Ranching, Cotton, Tobacco and Land Company of Rhodesia, Limited's, estates.





carried over a mesh wire cloth and through numerous gangs of torsion springs. The result is that the ground nuts are pulled off the vines without any injury to the shell. A stemmer attachment removes the stems, and a fan blows out all the dirt, trash and immature nuts, the entire process resulting in a product equal to the hand-picked nut. The machine will also hull cow peas and the like satisfactorily when cut with the pods on the vines and when properly cured.

Three styles of Benthall Pickers are built, one operated by horse power and the others for engine power. The machine can be operated by either steam, petrol or oil engine or tractor when fitted with a pulley. It has been successfully operated here with a 5 h.p. paraffin engine.

It must be at once evident that the machine cannot pick off the nuts if they are not on the vines, so that the capacity of the machine is governed largely by the crop conditions; the greater the number of nuts on the vines, the greater will be the output per hour.

The machine is said to pick nuts off the vines in any condition the same day they are dug, if desired, which feature makes it possible to pick the crop before the vines have become damaged by being exposed to the weather, thereby making it possible to save the vines for hay. It is, however, claimed that better results are obtained when the vines and nuts are dry.

A re-cleaning and bagging device attachment is supplied for either style of power machine of 13 feet and 16 feet sizes. The nuts, after coming from the machine, are carried over a vibrating, adjustable screen, and subjected to a fan blast, which operation separates the tap roots and large pieces of vines that sometimes come from the machine when conditions are not favourable for picking. The attachment is recommended particularly for the Spanish variety. The extra cost is a trifle compared with results obtained by its use.

It was found that under the crop conditions of the past season the capacity of the machine was about 9 bags per hour or 90 to 100 bags per day of 10 hours.

The nuts were not perfectly clean, a fair amount of stick and tap root going into the bags, the reason for this being

that owing to the drought the nuts were very light and that when the draught from the fan was increased sufficiently to blow away the sticks, etc., light nuts were blown out as well. This meant that the nuts had to be gone over by hand afterwards, a boy doing six to eight bags per day. The machine would do much better work after a normal season.

The machine is said to pick up to 250 bags per day, according to yield and variety.

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## Loughborough College,

Leicestershire, England.

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### OPEN SCHOLARSHIPS IN ENGINEERING.

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The College Governors invite applications for the award of five Open Scholarships in the Faculty of Engineering, each of the value of £75 per annum. The Scholarships are open to British subjects situate in any part of the Empire, and are tenable at Loughborough College, Leics., England, for the period of the full diploma course.

The entrance examination for the session 1929-30 will take place on Tuesday, Wednesday and Thursday, the 16th, 17th and 18th April, 1929. All applicants must be not less than 16 years of age on the 1st of October, 1929.

Candidates resident in the United Kingdom will be required to attend at Loughborough. Candidates resident in other parts of the Empire will be examined on the dates named at local centres where recognised facilities are available, and have been approved by the College Governors.

Further particulars and application forms may be obtained from the College Registrar, to whom all forms of application must be returned not later than the 28th of March, 1929.

H. SCHOFIELD, Ph.D., B.Sc. Hons. (Lond.),

Principal of the College.



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## Bee-Keeping in Rhodesia.

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### THE HONEY FLOW: WHAT IT IS.

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By T. SAVORY.

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**The Indigenous Flow.**—What is known to and recognised by the apiarist under this term is the yearly or bi-yearly secretion of nectar in the flowers of indigenous trees, bushes, creepers, flowers, grasses, heathers, or even mosses of the bush or open plains. This in the two Rhodesias can be said to occur twice in the year, in early spring, or first bloom of spring, and in mid autumn, when some of the thorns and other varieties of the trees, etc., send out their flowers in advance of their winter foliage. From all of these the up-to-date and practical bee-keeper should reap the full result in honey. In this matter of nectar the flora is generally very rich, though, with the exception of botanists, etc., probably very few other than apiarists have any idea how extensive the flow is. All such trees as the waterboom, tamarind, teak, mahogany, mukwa, syringa (m'nondo), m'sasa, trychilea (m'singele), wild violet, mahobohobo, m'bourla, the various acacias, bushes and shrubs as the bauhinias and sugar bush, give a yield of nectar which is so great that it will fall in showers if a branch is shaken, and must be seen to be believed. Creepers such as the wild jasmine, traveller's joy (wild clematis), Zimbabwe creeper, and others unknown by name, and heathers and some mosses, are all heavy yielders of nectar. The trees referred to often present one mass of blossom over the entire top, lasting several days in some instances, during which period may be seen at various hours of the day, from early dawn to long after sundown, thousands of bees collecting nectar and pollen and hurrying away with it as fast as their wings can

carry them. With regard to grasses, there is no actual evidence to the writer that these yield nectar, but they are rich in pollen and what is known as honey-dew, and bees often crowd on them so thickly at certain times that it would seem as if there were some attraction greater than pollen only.

This first flow as a rule starts about the second or third week in August, though, as the seasons are often late or early, no hard and fast rule can be laid down. This is best left to the keen notice of the bee-keeper, who, if he or she has brought preparations up to date during the winter, will have everything in readiness when the flow does start. It is much to be regretted that there is no available guide as to the various names of the best nectar-yielding trees and shrubs of the indigenous flora of these territories, but it may fairly be taken for granted that most, if not all, of the bush trees are productive. As some of them do not blossom until late November, the position is really a fortunate one for the industry, securing to late breeding colonies every opportunity for storing their surplus honey. The second honey-flow takes place about April, again depending largely upon the vagaries of the rains of that time, and it is mainly to be looked for from the heavy flowering of the winter foliage thorn trees that abound in so many places. There are also various creepers, shrubs and veld flowers that blossom at this time from which the bees draw much nectar in order to provide food for the approaching winter, which, under the system of the double brood chamber advocated in an earlier issue of this Journal, should give the apiarist ample opportunity for obtaining the second crop of the season. During these two flows the owner will require to pay considerable attention to his colonies (though not in point of actual time) if he wishes to reap the full benefit of them. A glance every three days or so made by lifting up enough of the top quilt to inspect one or perhaps two frames will at once show how the crates of frames or sections are filling up. As soon as they appear to be nearly full and are being capped, a fresh crate of frames should be inserted underneath the top one, and so on while the flow lasts, care being taken not to disturb the inmates more than possible, though at this time they are more easily handled than at any other.



**The Supplemental Flow.**—It will be some years, probably a generation or more, before these Territories can hope to vie with America, Canada, etc., in the production of honey from this source of flow, which to-day, as a matter of fact, is the chief source of honey in those countries. The last statistics available give the following figures:—In seven States there was an acreage under clover of 3,500; in New York there were 35,000 acres under alfalfa; in Ohio 29,000 acres; in Indiana and Illinois 18,000 each; in eight others 60,000 acres, while Colorado reported 509,000 acres, and in eleven other States there were some 2,445,000 acres, all these being supplementary to the indigenous flora of the land. These figures are only given here to show how entirely dependent America is upon her cultivated flow for her undoubted lead in the production of the world's honey supply. Our own under this head may now be considered. Starting with the farmer's main crop of maize, this is of no use to him as a source of nectar, though for pollen it is of good value and it extends over quite a long period. Lucerne and all clovers (perhaps the best of all plants) are unfortunately negligible crops here, and can hardly be relied upon as of any real use, as very few farmers grow either. Cotton promised well a year or so ago, but here again, until the diseases are more under control, there is not much hope for the bee-keeper. In America this crop has a large source of nectar, and in several parts rises to the rank of a great honey plant; in Texas, for instance, it yields nearly one-fifth of the entire crop of honey produced in that State. Cotton honey also compares favourably with the very best grades of honey. Its yielding powers are, however, variable, and the type of soil has a great deal to do with the yield. So far as the writer has noticed, the soils of Northern Rhodesia as well as the climate do not lend themselves to the secretion of much nectar from cotton, for in two years' cultivation of these crops of 100 and 170 acres in extent no bees were observed on the lands throughout the season of flowering. Tobacco has much more promise, and if this crop comes into prominence, as many believe it will, it will prove a source of much gain to the apiarist. The honey resulting from tobacco plants is of a fine light colour, of excellent taste, and as an

example of what can be had from this source it might be mentioned that during the month of May last the writer had ten colonies filled, sealed and capped from some 15 acres of tobacco, and had he not been away in the Union at the time, probably another ten crates could also have been filled in the time. Of the smaller catch-crops often grown, perhaps buckwheat and sunflowers come first. As both of these are of considerable value for poultry and are very rich in nectar, they may well be here named. Pumpkins and all of the melon family, with cucumbers and the cattle melon (majordas), are rich in nectar, and on each the bees may be seen in their hundreds at all hours of the day. Cow peas and most of the legumes are heavy nectar producers, and are catch-crops of many farmers and therefore of value to the apiarist. Perhaps of all under this class, those of the citrus family should rank first. These are found to a certain extent on all farms. The honey is of a deep amber colour and of a beautiful flavour. Then also of much value are the mango, guava, grenadilla, peach, loquat and the banana, all trees of more or less culture and growth, while the pawpaw, so common around most homesteads, ranks as one of if not the heaviest yielder of nectar of the whole group. Of farm ornamental and timber trees, the gums (eucalypts) are probably the most common, and very few are without some. There are many varieties, but it is generally accepted that all of them are producers of nectar, some in great abundance. The sugar gum (*eucalyptus cladocalyx*\*) is the richest in this respect and is reported to be as useful a timber as almost any of the kinds. The foregoing examples will show that the supplemental crops are by no means of small value, and that as the industry goes ahead, so will the yield of honey grow in these Territories. There are still several other sources that could be mentioned. It may not be generally known that honey or nectar is by no means obtained from the flowers alone, but that many plants give it from what are called extra floral nectaries, occurring on the under side of the leaves. These are most active at the time when the leaves reach full maturity, when the nectar will often collect on these glands in such large quantities that

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\* This tree has been difficult to establish in Southern Rhodesia.—(Ed.)



one can easily taste it. At these times the bees will neglect the blossoms, and the honey will come in to the hives very rapidly; this is especially the case with cotton, the cassias, young corn, oats and wheats, also with tomatoes and many other plants.

It has already been stated in these articles that it does not pay to grow garden plants for feeding bees, but as every farmhouse has its garden, and as most of the nicest flowers are the richest in nectar, it is as well that those who are interested in bees should plant what will suit them best, and a short list of such flowers may with advantage close this article. Mignonette easily holds the first place, of which it is said that an acre would produce enough nectar to keep 50 colonies in food, while the honey is of a delicious flavour. Daisies, cosmos, stocks, a few roses, phlox, snapdragon, peas, balsams, are some of the best. The well-known red hot poker is a great bearer and the nectar can be shaken out in handfuls. Then dandelions, forget-me-nots, violets, hollyhock, marigold, mint, thyme, asters, are all capital garden plants and flowers, and should figure in the home-stead of every bee-owner, for most of these are spread over quite a long period of blossoming, and so are of increased value. The sugar bush should have an honourable mention, for although it only grows in certain parts of the country, it is one of the heaviest of yielders, while as garden creepers the shower of gold (*bignonia venusta*) and the antigon are covered with bees from early dawn to past sundown and are a veritable source of profit to the apiarist.

It will thus be seen that the supplemental honey flow of the Rhodesias is one that will grow with the passing years and one that under ordinary conditions should soon outgrow the indigenous ones. In course of time it should increase, the output of honey by leaps and bounds.

## Empire Tobacco Discussed in the House.

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In the House of Commons, on 6th June, Mr. Hannon asked the Secretary of State for Dominion Affairs the comparative figures of the production of tobacco within the Empire in 1920 and 1927; what percentage of the total production has now been reached in Rhodesia; and what special steps are being taken by the Empire Marketing Board to encourage the sale of Rhodesian tobacco in Great Britain?

Mr. Amery: An accurate statement in the form desired by my hon. friend cannot be given, as no figures of the production of tobacco are available for Ceylon and certain other Colonies. The production of tobacco in other parts of the Empire was estimated in 1920 at 1,071 million lbs., of which 3 million were produced in Southern Rhodesia. In 1927 production was estimated at approaching 1,100 million lbs. in these countries, of which Southern Rhodesia produced 19 millions, or 1.75 per cent. of the total. The Empire Marketing Board are awaiting the forthcoming report on tobacco of the Imperial Economic Committee before deciding how they can best further the sale of Empire tobacco in this country. They have, however, recently been in consultation with representatives of the Government of Southern Rhodesia on the subject of the means that might be adopted to make it known to the public that excellent cigarettes of Rhodesian Virginian tobacco are now available.

Mr. Hannon: Is my right hon. friend aware of the steadily growing superior quality of Rhodesian tobacco, and will he ginger up the Empire Marketing Board in the matter?

Mr. Amery: As a non-smoker, I can only go on evidence that reaches me from many quarters. I gather that it is as my hon. friend says.

Lieut.-Commander Kenworthy: May I ask whether at the Colonial Office entertainments and receptions Colonial cigars are supplied?



Mr. Amery: If the hon. and gallant member will call on me at my office, I shall be very glad to offer him only Colonial cigarettes.

Mr. Barclay-Harvey: Are the efforts of the Empire Marketing Board also being directed to tobacco grown in Nyasaland and other parts of British Africa?

Mr. Amery: Yes, certainly.

Mr. Shinwell: Does the fact that the right hon. gentleman is a non-smoker induce him to recommend this tobacco, which cannot be smoked?

Mr. Amery: No, I go on the advice given me.

Colonel Woodcock: Is not this year more important than any year for Southern Rhodesia, because of the tremendous increase of tobacco grown there, and will he ask the Empire Marketing Board to use every effort this year?

Mr. Amery: I think my answer made it clear that the Empire Marketing Board was using every endeavour in connection with Rhodesian cigarettes, and I am sure my hon. friends can help in the matter.—(*Tobacco.*)

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## “Book-Keeping on the Farm.”

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The following reply to an enquiry received by the Accountant of the Department of Agriculture is published for general information:—

“I have pleasure in informing you that analysis Cash Books very similar to that illustrated in the article on Book-keeping published in the *July Agricultural Journal* can be obtained from the Art Printing Works, Salisbury, for 4s. 6d. They have two kinds at the same price; one has four analysis columns on each page, and the other has seven columns.

“As the totals of the analysis columns are transferred to the ledger only at the close of each year, the time spent in keeping books in this manner should not be more than a few minutes each day, and there is always the advantage of having a rough statement of accounts by comparing the totals of the various columns of the cash book at any time.”

## Price List of Forest-Tree Transplants, Ornamental Trees and Shrubs, Hedge Plants, Creepers and Seeds,

OBTAINABLE AT THE GOVERNMENT FOREST  
NURSERIES.

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1. Transplants of forest trees, etc., as far as in stock, are obtainable at the subjoined rates.

2. Orders should be addressed to the Forest Officer, Department of Agriculture, Salisbury; or Manager, Forest Nursery, Salisbury; or Manager, Mtao Forest Reserve, P.B. Umvuma.

**3. All orders must be accompanied by a remittance in cash, bank note, postal order, draft or cheque, made payable to the Department of Agriculture, Salisbury. Under no circumstances will plants or seeds be sent out, or taken away from the Nurseries, unless paid for.**

4. All transplants are despatched at Rate 10 on railways at purchaser's risk. The transplants are watered as far as this is possible by the railway staff.

5. All prices quoted are for delivery free at any station or siding in Southern Rhodesia.

6. Purchasers of trees contained in tins either of 25 or 4 trees are requested to return the tins, carriage forward, to the nursery from which they were obtained, either Manager, Forest Nursery, Salisbury; or Manager, Mtao Forest Reserve, Fairfield Siding. If the tins are not returned within two months from date of issue, they will be charged for at the current rate of petrol tins; present price, 4d. each.

7. No trees will be reserved unless specially booked. Orders will be executed in order of receipt as trees are ready for despatch. Every effort will be made to comply with instructions of purchasers.



8. Transplants of forest trees, when quoted at per 1,000, are grown in half paraffin or petrol tins containing 20 to 25 transplants. The average weight of each tin is about 25 lbs. Height of transplants about 3 to 12 inches.

9. Transplants of larger size, from 1 ft. to 3 ft., are also supplied four in a tin at per tree. Weight of tin about 25 lbs.

10. Shrubs and ornamental plants in single tins have a weight of about 5 lbs.

11. To purchasers of forest trees, the following reductions are made:—

(a) When the number exceeds 1,000, the price is £3 5s. per 1,000.

(b) When the number exceeds 5,000, the price is £2 14s. per 1,000.

12. Orders for seed are posted or railed free of charge.

13. Though every care is taken to supply trees and seeds true to name and of good quality, no guarantee can be given in this respect, more particularly in regard to seed.

14. Intending tree planters are invited to apply to the Forest Officer, Department of Agriculture, Salisbury, for advice as to the most suitable trees for growing in the various climates and soils of the Colony, and on the best methods to adopt in the formation of plantations, wind breaks and shelter belts.

15. From time to time a list of plants ready for delivery is published in the *Rhodesia Agricultural Journal*. This list may be had on application to the Department.

**Price of Transplants.**—For convenience, the following symbols are used to indicate the purchase prices of transplants:—

A—Trees, 25 in tin, at 2s. 3d. per tin, £3 5s. per 1,000; £2 14s. per 1,000 for orders over 5,000.

B—Trees and shrubs, 24 in tin, at 3d. each.

C—Trees and shrubs, 4 in tin, at 4d. each.

D—Trees and shrubs, 4 in tin, at 9d. each.

E—Trees and shrubs at 9d. each; extra large up to 5s. each.

Botanical name.	Common name.	Remarks.	Price of trans-plants.	Price of seed.	
				Lb	Oz.
<i>Callitris calcarata</i>	Black cypress pine	... Usually rather slow growing, but reaches a fair size and produces a valuable durable softwood. Suited for dry country planting, especially in sandy soil. Resistant to white ants. Good shelter for orchards, etc.	A. C.	15s.	1s.
<i>Callitris robusta</i>	White cypress pine	... Similar to <i>Callitris calcarata</i> . Better for poor acid soils and ironstone kopjes.	A. C.	15s.	1s.
<i>Callitris Whytei</i>	M'lanje cedar	... Suitable for the Eastern Border, higher altitudes and rainfall areas. An indigenous tree.	A. C.	15s.	1s.
<i>Casuarina Cunninghamiana</i>	Beefwood	... A fine large shade tree, suitable for avenues and narrow belts, but not recommended for timber plantations. Requires deep soil in drier localities. The foliage is useful for stock fodder, and the tree stands lopping well.	A. C.	...	2s. pkt 1s.
<i>Cedrela toona</i>	Toona tree	... A rapid-growing, handsome, semi-deciduous tree, suited for moister localities where frost is slight. Yields a valuable soft timber. Recommended for plantations, as well as shade and ornament.	A. C.	15s.	1s.
<i>Cupressus arizonica</i>	Arizona cypress	... A hardy evergreen tree, suitable for dry localities, but requiring a well-drained and rather deep soil. Useful for shelter belts and also for hedges when closely planted.	A. C.	15s.	1s.



<i>Cupressus lusitana</i> ...	Portuguese cypress ...	A fast-growing cypress, producing an excellent soft-wood timber, but requires a moist, cool climate and a good soil. May well be used for shelter and hedges in favourable localities.	A. C.	5s.	6d.
<i>Cupressus sempervirens</i> , var. <i>horizontalis</i>	Common spreading cypress	A hardy cypress, suited for limestone as well as other soils. Not so frost or drought hardy as <i>Cupressus arizonica</i> . Suitable for shelter and hedges.	A. C.	15s.	1s.
<i>Cupressus sempervirens</i> , var. <i>pyramidalis</i>	Common upright cypress	An ornamental tree for gardens and cemeteries. Also useful as a shelter tree. Grows under similar conditions to the "var. <i>horizontalis</i> ."	A. C.	15s.	1s.
<i>Cupressus torulosa</i> ...	Himalayan cypress ...	A good tree for timber and shelter. Withstands much cold and drought. Not very soil exacting. Fairly frost-hardy.	A. C.	10s.	9d.
<i>Eucalyptus botryoides</i>	Bangalay ...	A large-leaved, heavy-foliaged gum. Quick growing. Suitable for granite and red soils. Withstands frosts, but not very drought-resistant.	A.	15s.	1s.
<i>Eucalyptus citriodora</i> ...	Lemon-scented gum ...	A clean-toled tree, producing an excellent timber. Leaves lemon scented. Suited for wetter regions and on the better soils in the lower rainfall regions. Will not withstand much frost or drought. Flowers prolifically, rendering it very useful for honey production.	A.	15s.	1s.
<i>Eucalyptus crebra</i> ...	Narrow-leaved ironbark	A slow-growing, deep-rooting species, producing excellent timber. Suitable for well-drained soils in the higher rainfall areas. Withstands a certain amount of drought and light frosts. Will not thrive in an acid soil.	A.	15s.	1s.

Botanical name.	Common name.	Remarks.	Price of seed.	
			Price of trans-plants.	Price of seed.
			Lb.	Oz.
<i>Eucalyptus globulus</i> ...	Tasmanian blue gum ...	A fast-growing tree, suitable for cool, moist areas with deep soils. Will not withstand drought, but is frost-resistant to a large extent. Produces a useful timber.	A.	15s. 1s.
<i>Eucalyptus maculata</i> ...	Spotted gum ...	One of the best trees for timber production or shelter in the wetter areas, being fairly hardy to drought but not to frost. Produces an excellent timber.	A.	15s. 1s.
<i>Eucalyptus maideni</i> ...	Maidens' gum	A very fast-growing, large tree, with bluish foliage in youth. Fairly drought and frost resistant. Will grow on poor soils if deep and well-drained. Produces a good, strong, useful timber.	A.	30s. 2s.
<i>Eucalyptus melliodora</i>	Yellow box ...	A medium-sized tree, useful for shelter belts. Produces a tough, durable timber. Very resistant to drought and frost. Valuable for honey production, having abundant sweet flowers.	A.	15s. 1s.
<i>Eucalyptus microcorys</i>	Tallowwood ...	A first-class timber tree for the Eastern Border and Melssetter districts, producing a very strong, durable wood of greasy lustre. Not hardy to frost or drought. Requires a deep, fertile soil.	A.	15s. 1s.
<i>Eucalyptus paniculata</i>	Grey ironbark	A very good timber tree, with heavy foliage. Suitable for the moister regions, with a deep, fertile soil. Withstands some drought, but is frost-tender. Yields an excellent, hard, durable wood.	A.	15s. 1s.



<i>Eucalyptus pilularis</i> ...	Blackbutt ...	... A large, rapid-growing tree, producing a strong, durable timber. Thrives only in moist localities. Somewhat frost-tender.	A.	15s.	1s.
<i>Eucalyptus punctata</i> ...	Leather jacket	... A tree of fair size, yielding a good, durable timber. Adaptable as regards soil and climate, but will not withstand a dry, cold climate.	A.	15s.	1s.
<i>Eucalyptus resinifera</i> ...	Red mahogany	... A very good timber tree in moist regions with deep soils. Will not flourish where frosts are severe. Grows very rapidly during the first five or six years, then tends to slow down. Good for poles and quickly-established shelter belts.	A.	15s.	1s.
<i>Eucalyptus robusta</i> ...	Swamp mahogany	... A quick-growing, shady tree, which requires a moist soil for best results, but will grow under fairly dry conditions provided frost is not severe. Recommended rather for shelter belts than plantations.	A.	15s.	1s.
<i>Eucalyptus rostrata</i> ...	Red gum ...	... Produces an excellent and durable hardwood. Withstands drought, heat, brak, flooding and a good deal of frost. One of the best species for planting in Southern Rhodesia, except in sour soil and wet mountain regions.	A.	15s.	1s.
<i>Eucalyptus saligna</i> ...	Sydney blue gum	... A fast-growing, useful tree, producing a useful medium hardwood. Thrives on deep, fertile soils in the heavier rainfall areas. Tender to frost and drought.	A.	15s.	1s.
<i>Eucalyptus sideroxylon</i>	Red ironbark...	... A fairly slow-growing species, suitable for dry, rocky soils in the moister regions. Produces a good, durable hardwood.	A.	15s.	1s.

Botanical name.	Common name.	Remarks.	Price of trans-plants.	Price of seed.	
				Lb.	Oz.
<i>Eucalyptus tereticornis</i>	Forest red gum	... Similar to <i>Eucalyptus rostrata</i> , and can be planted along with it, except in areas liable to flooding and great heat. Perhaps not quite as drought-resistant.	A.	15s.	1s.
<i>Grevillea robusta</i>	Silky oak	... A handsome tree which thrives best in moist, warm localities. Useful for ornament, shade and timber. Frost-tender and not resistant to drought. If the locality is unsuitable, it may grow well for several years and then die out.	A. C.	...	pkt 1s.
<i>Jacaranda mimosaefolia</i>	Jacaranda	... An ornamental tree with feathery foliage and abundant blue flowers, which appear in spring. Best development is attained in the moister regions, but the tree withstands drought to a surprising extent, and may be planted in the drier regions if the soil is reasonably deep and fertile. It is tender to cold and frost, and may need protection in its earlier youth. Semi-deciduous.	A. C.	20s.	1s.3d. pkt 1s.
<i>Pinus canariensis</i>	Canary Island pine	... Hardy to drought, but not to severe frost. Best suited for planting on higher altitudes and in higher rainfall areas. Slow growth in early youth, then more rapid in later years. A handsome tree with inverted, umbrella-like branches, not spreading. Yields an excellent softwood timber.	A. C.	15s.	1s.
<i>Pinus halepensis</i>	Aleppo pine	... A drought-resistant pine which will grow on limestone and shale soils. Not recommended for plantations, but can be used for shelter and ornamental purposes in the drier regions.	A. C.	15s.	1s.



<i>Pinus insignis</i>	...	Remarkable pine	... A large tree of very rapid growth, producing a useful softwood. Most at home in the heavier rainfall areas. Does not like sour or poorly-drained soils. Frost-hardy but not drought-resistant, usually failing at an early age in the drier regions.	A. C.	15s.	1s.
<i>Pinus longifolia</i>	...	Chir pine	... A somewhat slow-growing pine, but useful to plant in localities where the climate and soil are doubtful at the higher elevations. For timber and ornamental purposes. Not frost-resistant or very drought-hardy.	A. C.	15s.	1s.
<i>Pinus pinaster</i>	...	Cluster pine	... Yields a useful, strong softwood. Does well on sandy soils and soils without much lime, in the better rainfall areas. Not very drought-resistant.	A. C.	15s.	1s.
<i>Populus alba</i> ...	...	White poplar...	... A rapid-growing poplar, requiring a good, deep soil in close proximity to running water. Propagated by suckers. Deciduous.	Sucker's at 3d. each		
<i>Populus deltoidea</i> , var. <i>missouriensis</i>	...	Carolina poplar	... A very fast-growing poplar, producing a very good timber for matches, etc. Requires a rich, moist, alluvial soil. Moderately frost-hardy. Does not like stagnant water.	D.		
<i>Salix babylonica</i>	...	Weeping willow	... A useful timber and ornamental tree, requiring a moist, well-drained soil which is occasionally flooded. Not suited for ground in which water is stagnant.	C.		
<b>Ornamental Trees, Shrubs and Hedge Plants.</b>						
<i>Aberia cafra</i> ...	...	Kei apple	... A rough, thorny, impenetrable shrub, making a good hedge. Withstands frost and drought well. Suited for all but the driest areas of the Colony. More useful than ornamental.	B. E.		

Botanical name.	Common name.	Remarks.	Price of trans-plants.	Price of seed.	
				Lb.	Oz.
<i>Abutilon chinensis</i> ...	Chinese lantern	... An ornamental shrub, with orange-coloured flowers, requiring a heavy pruning about the fourth year.	E.		
<i>Abutilon Thompsonii</i> ...	Chinese lantern	... Similar to the above, but has variegated leaves.	E.		
<i>Acacia Baileyana</i> ...	Silver wattle...	... A small ornamental tree with blue foliage and yellow flowers.	E.		
<i>Aloysia citriodora</i> ...	Lemon-scented verbena	A small shrub with a strongly lemon-scented foliage. Hardy, vigorous, quick-growing.	E.		
<i>Bauhinia galpini</i> ...	Pride of de Kaap	... A rambling shrub, bearing orange-red flowers.	D E.		pkt 1s.
<i>Bauhinia acuminata</i> ...	Bauhinia	... A large indigenous shrub, flowering profusely in early spring. White flowers.	D. E.		pkt 1s.
<i>Bauhinia purpurea</i> ...	Bauhinia	... Similar to the <i>Bauhinia acuminata</i> , but with mauve flowers.	D. E.		pkt 1s.
<i>Bolusanthus speciosus</i> ...	Rhodesian tree-wisteria	An indigenous, deciduous tree with blue flowers at the end of long stalks. Ornamental.	E.		
<i>Brugmansia Knightii</i> ...	Moonflower	... A flowering shrub with large, drooping, white flowers. Strong scent (cf. lily). Fairly frost-hardy.	E.		
<i>Buddleia</i> ...	Blue buddleia	... A medium-sized shrub with sweet-scented blue flowers. Useful as a hedge. Rapid-growing, but frost-tender.	E.		



Buddleia	...	Yellow buddleia	... A rank-growing, yellow-flowering shrub. hedge. Rapid-growing. Frost-tender.	Useful as a	E.
Callistemon speciosus	...	Bottlebrush	... A scarlet-flowering shrub of drooping habit. excellent hedge if trimmed along the top only.	Makes an	A. C. E.
Carica papaya	...	Pawpaw	... A small tree with a large, dark green foliage, bearing large edible fruits.		2s. pkt 1s.
Cassia capensis	...	Cape laburnum	... A rapid-growing shrub, bearing masses of bright yellow flowers.		E.
Cestrum auranticum	...	Ink berry	... A small shrub, bearing orange flowers in profusion.		E.
Cinnamomum camphora	...	Camphor	... A somewhat slow-growing, ornamental, evergreen tree, with camphor-scented foliage. It requires a deep soil in the higher rainfall zones.		D.
Croton sylvaticus	...	Mount Selinda linden	... A large-leaved, deciduous tree from Melsetter.		E.
Cytisus scoparius	...	Broom	... A shrub with very small bract-like leaves, with large terminal stalks of dehiscent yellow flowers.		E.
Dahlia imperialis	...	Tree dahlia	... A medium-sized shrub, making a handsome show with its single white blooms.		E. pkt 1s.
Dalbergia sissoo	...	Sissoo	... A large deciduous tree from India, producing an excellent timber. Desires a deep, porous, well-drained soil in close proximity to running water. Will not tolerate stiff clay. Frost-hardy, but not very drought-resistant. Rapid-growing.		D.
Deutzia crenata	...	Bridal wreath	... A small deciduous shrub with double white flowers, tinged slightly pink, on long, drooping stalks.		E.

Botanical name.	Common name.	Remarks.	Price of trans-plants.	Price of seed.	
				Lb.	Oz.
<i>Duranta plumieri</i> ...	Tree forget-me-not	... A medium-sized, deciduous shrub with blue flowers. Useful as a hedge. Very hardy.	E.		
<i>Eugenia braziliensis</i> ...	Brazilian cherry	.. A small shrub, bearing orange-coloured, edible fruits. A useful hedge plant.	D.		
<i>Euphorbia fulgens</i> ...	Euphorbia ...	... A small shrub with handsome scarlet flowers.	E.		
<i>Euphorbia splendens</i> ...	Christ thorn ...	... A small thorny shrub with bright scarlet flowers. Suitable for low hedges and borders.	E.		
<i>Freylina tropica</i> ...	... ..	... A useful hedge shrub. Indigenous.	B.		
<i>Gardenia florida</i> ...	Katjepeering	... A compact, evergreen shrub with dark green, glossy leaves and pure white, sweetly-scented double flowers.	E.		
<i>Heliotropium peruvianum</i>	Heliotrope ...	... A small shrub with sweet-scented lilac or nearly white flowers.	E.		
<i>Hibiscus sinensis</i> ...	Chinese rose ...	... Evergreen shrub with numerous scarlet flowers. Double and single varieties.	E.		
<i>Hibiscus syriacus</i> ...	Christmas rose	... A shrub of which there are single and double varieties with white flowers.	E.		
<i>Holmskioldia sanguinea</i>	Holmskioldia...	... A fairly hardy shrub, bearing a profusion of brick-red flowers in large bunches. Suitable for hedges.	E.		



Holmskioldia sp.	...	Holmskioldia...	... A yellow-flowering, handsome shrub similar to Holmskioldia sanguinea.	E.
Hypericum lanceolatum	...	St. John's wort	... A small, yellow-flowering shrub. Multitudes of flowers.	E.
Iochroma tubulosa	...	Iochroma	... A shrub with dark blue flowers.	F.
Iochroma	...	Iochroma	... A shrub with scarlet flowers.	E.
Lagerstroemia indica	...	Pride of India	... A large ornamental shrub, with mauve and pink flowering varieties. Handsome and hardy.	E.
Lasiandra	...	Lasiandra	... A shrub with hairy, purple-green foliage and large handsome purple flowers. Not very hardy.	E.
Ligustrum lucidum	...	Chinese privet	... An excellent hedge plant or ornamental shrub. Can be clipped into shape. Liable to die off in patches or lose its lower leaves unless planted in moist soil of fair depth. Propagated from cuttings.	A.
Melia azedarach	...	Syringa	... A deciduous tree, producing a good light timber. Shallow rooting. Withstands drought well. Has fine lilac flowers and persistent yellow berries. Suitable for better rainfall areas and deep sandy soil, but will grow under severe conditions.	E.
Michelia champaca	...	Champak	... A tall, handsome, evergreen tree from India, with scented yellow flowers. Requires a deep fertile soil in the heavy rainfall zones.	E.
Mimosa pudica	...	The sensitive plant	... A small plant, leaves and flowers folding up when the plant is irritated by touching it.	E.
Moschosma	...	Rhodesian spirea	... A medium-sized, blue-flowering shrub.	E.

Botanical name.	Common name.	Remarks.	Price of seed.	
			trans-plants.	Price of seed.
			Lb.	Oz.
<i>Morus alba</i> ...	White mulberry	... A fast-growing, deciduous tree which coppices well. Useful for high hedges. Bears white or red fruits. Leaves best food for silkworms. Hardy.		
<i>Pereskea aculeata</i> ...	Barbadoes gooseberry...	A shrub which tends to climb. With recurved thorns. Produces fleshy leaves.	D.	
<i>Persea gratissima</i> ...	Avocado pear	... A shrub with an edible fruit.	3s. each	
<i>Photonia japonica</i> ...	Loquat	... A small evergreen tree with large leaves, bearing yellow edible fruit	D. E.	
<i>Phytolaca dioca</i> ...	Belhambra	... A rapid-growing, deciduous tree. Useful for ornament. Timber of no value, but seeds valuable as a poultry or cattle food.	A.	pkt 1s.
<i>Pittosporum undulatum</i>	Camphor laurel	... An Australian evergreen shrub, making an excellent hedge, with shining, green, scented leaves and scented berries.	D.	
<i>Platanus orientalis</i> ...	Plane	... A deciduous ornamental tree, requiring moist climates with deep, fertile soils. Not drought-resistant.	E.	
<i>Plumieri rubra</i> ...	Frangipani	... A handsome shrub with pinkish red flowers. Rather delicate.	2s. 6d. each	
<i>Poinsettia pulchrima</i>	Poinsettia	... A shrub with small yellow flowers surrounded by many large, scarlet, leaf-like bracts. Very showy. Double and single varieties.	E.	



<i>Poinsettia albida</i> ...	<i>Poinsettia</i> ...	... As above, but with yellowish white bracts. Double and single varieties.	E.
<i>Psidium pomiferum</i> ...	<i>Guava</i> ...	... A small, hardy, evergreen tree, bearing edible, yellow fruit.	D. E.
<i>Punica granatum</i> ...	<i>Pomegranate</i> ...	... A shrub or small tree, having shining leaves, large scarlet flowers and large red fruit. Makes a useful hedge when well cut regularly.	E.
<i>Rhus lancea</i> ...	<i>Karreeboom</i> ...	... A small indigenous tree of graceful appearance, yielding a very durable wood. Useful for ornamental purposes. Forms a fine hedge.	A. 10s. 9d.
<i>Salvia involucra</i> ...	<i>Salvia</i> ...	... A free-growing shrub, with red flowers. Not frost-hardy.	E.
<i>Spathodea campanulata</i> ...	<i>African flame tree</i> ...	... A handsome, heavy-foliaged tree, bearing bright red flowers. Suited for the heavier rainfall areas on deep soils.	D.
<i>Sterculia acerifolia</i> ...	<i>Flame tree</i> ...	... A handsome, evergreen tree with large red flowers in clusters. Suited for districts where frost is light.	E.
<i>Streptosolon Jamesonii</i> ...	<i>Streptosolon</i> ...	... A shrub with orange-coloured flowers in dense masses and pale green foliage. Very frost-tender and delicate.	E.
<i>Tecoma Smithii</i> ...	<i>Tecoma</i> ...	... An upright, medium-sized shrub with tubular, bright yellow flowers. Forms a useful hedge. Fairly drought-resistant.	A. E. pkt 1s.
<i>Thevetia neriiifolia</i> ...	<i>Thevetia</i> ...	... An evergreen shrub, bearing bell-shaped, yellow flowers. Hardy.	E.

Botanical name.	Common name.	Remarks.	Price of	Price of seed.	
			trans- plants.	Lb.	Oz.
Thuya orientalis	Thuya	... A very hardy conifer that withstands heat, cold and drought, and does not mind heavy soils. Slow-growing. Of small size. Very good for hedges.	A. C.	pkt 1s.	
Roses from 1s. to 3s. 6d. each.					
<b>Climbers and Creepers.</b>					
Aristolochia elegans	Dutchman's pipe	... A rank-growing creeper. Heart-shaped leaves. crimson flowers, spotted yellow.	Purplish 9d.	Plants each.	
Beaumontia grandiflora	Beaumontia	... A large climber with heavy, glossy foliage. Large white, bell-shaped flowers. Blooms profusely. Fairly frost-tender.	Large 1s. 3d.		
Bignonia venusta	Golden shower	... Vigorous creeper. Rapid-growing. Bears masses of orange flowers all the year round. Very useful and hardy.	1s. 3d.		
Bignonia speciosa	Bignonia	... A rapid-growing, showy creeper, bearing large mauve flowers. Decumbent.	9d.		
Bougainvillea splendens	Bougainvillea	... Vigorous climber. May be also used as a hedge. Bracts magenta. Fairly frost-hardy.	1s. 3d.		
Hedera helix	Ivy	... A dark evergreen climber. Best in shady, cool climates.	9d.		



<i>Jasminum sambac</i> ...	Jasmine ...	... A vigorous, evergreen shrub climber with large trusses of fragrant, white flowers.	1s. 3d.
<i>Jasminum grandiflorum</i>	Climbing jasmine	... A hardy climber with scented, white flowers.	9d.
<i>Jasminum primulinum</i>	Climbing jasmine	... A yellow-flowering species similar to <i>Jasminum grandiflorum</i> .	9d.
<i>Lonicera periclymenum</i>	Honeysuckle (Woodbine)	Hardy climber with sweet-scented flowers, yellow inside, reddish purple outside.	9d.
<i>Lonicera sempervirens</i>	Red honeysuckle	... Climber with red flowers. Best kept well pruned or base becomes ugly.	9d.
<i>Mandevilla suaveolens</i>	Mandevilla ...	... Deciduous climber, bearing trumpet-shaped, white, fragrant flowers. Very slender.	9d.
<i>Passiflora edulis</i> ...	Granadilla ...	... A quick-growing climber, bearing edible fruits. Subject to woolly aphid if overshaded. A good trellis plant.	9d.
<i>Passiflora coccinea</i> ...	Fiji granadilla	... A large-leaved climber, bearing yellow fruits. Flowering well. A good trellis plant.	9d.
<i>Podranea Brycei</i> ...	Zimbabwe creeper	... A rank-growing indigenous creeper with large, pink flowers.	9d.
<i>Rosa bracteata</i> ...	Macartney rose	... Plant with large green foliage and numerous white single flowers. Useful as a hedge plant.	1s.
<i>Solanum Wenlandii</i> ...	Blue potato creeper	... A rapid-growing creeper with tubular, blue flowers. Not frost-hardy.	9d.

## Movements of New Settlers.

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The following new settlers arrived in the Colony during the month of July, 1928:—

P. E. J. Cranford.—Arrived from Great Britain on 8th June and obtained employment on the Shamva Mine.

Colonel and Mrs. R. D. Jennings.—Arrived from Great Britain on 26th June on tour of inspection.

A. Henderson.—Arrived from the Union on 2nd July on tour of inspection.

P. L. Fouche.—Arrived from the Union on 2nd July on tour of inspection.

H. Thomson.—Arrived from the Union on 5th July on tour of inspection.

K. Francis.—Arrived from the Union on 5th July and proceeded to Mr. Dawson, Pembi Ranch, Concession.

J. E. Owen.—Arrived from the Union on 12th July on tour of inspection.

R. N. Seldon.—Arrived from Great Britain on 13th July and proceeded to Mr. D. C. Forbes, Stanmore, Arcturus, for a period of training.

A. Hewitt.—Arrived from Great Britain on 13th July and has left the Colony.

D. Spencer.—Arrived from Great Britain and is inspecting land.

J. J. Earl.—Arrived from the Union on 18th July on tour of inspection.

H. Knowlman.—Arrived from Canada on tour of inspection.

W. J. P. Pretorius.—Arrived from the Union on tour of inspection.

A. S. Robertson.—Arrived from Great Britain on 23rd July and proceeded to Mr. Morley, Nhuku, Salisbury, for a period of training.

L. V. Steele.—Arrived from Great Britain on 29th July and proceeded to Captain Moubray, Chipoli, Shamva, for a period of training.



# Southern Rhodesia Veterinary Report.

June, 1928.

## AFRICAN COAST FEVER.

No mortality was recorded until the 22nd of the month, when the disease was diagnosed on the farm Morgenson, in the Melsetter district. During the earlier period there had been a heavy mortality due to quarter-evil. The deaths allocated to Coast fever for the month were twenty-one.

Three lots of cattle which had passed through Morgenson prior to the discovery of infection were dealt with as follows:—

(1) One lot was slaughtered at the Rupisi River; smears from each beast were taken and examined, with negative results.

(2) Another lot was detained eighteen miles from Umtali and temperatured for four weeks. Four head were destroyed on showing a slight rise of temperature, but *post-mortem* and microscopic examinations proved negative. The remainder were disposed of for slaughter.

(3) The third lot was located twenty-five miles west of the Sabi River, in the Bikita district, twenty-three days after passing through Morgenson. One beast was destroyed on temperature, and *post-mortem* and microscopic examinations showed Coast fever. The herd was removed to clean veld and temperatured for four weeks, with negative results. All cattle were removed from the area west of the Sabi River over which these cattle had travelled, and arrangements made for fencing it.

## QUARTER-EVIL.

This disease was reported from most districts.

## TRYPANOSOMIASIS.

Cases reported from Melssetter, Gwelo, Hartley and Gatooma districts.

## ANTHRAX.

Outbreaks occurred on Aylmerfield, Stanmore and the Commonage in Salisbury district. Mortality, 3.

## HORSE-SICKNESS.

One case, Gwanda district.

## HEARTWATER.

One case diagnosed in the Chibi district in a bull from the Union of South Africa.

## TUBERCULOSIS.

One animal destroyed on re-action to the tuberculin test on importation.

## IMPORTATIONS.

From the Union of South Africa: Bulls, 87; cows, 105; heifers, 101; horses, 66; mules, 31; donkeys, 52; sheep, 1,255; goats, 664; pigs, 12.

## EXPORTATIONS (CATTLE).

To the Union of South Africa: For local consumption, 2,278; for export overseas, 6,000. To Belgian Congo: For slaughter, 1,505; for breeding, 949. To Portuguese East Africa: For slaughter, 177; for breeding, 5.

## EXPORTATIONS (MISCELLANEOUS).

To the Union of South Africa: Goats, 115; pigs, 64; horses, 2. To Northern Rhodesia: Goats, 57; sheep, 175. To Belgian Congo: Goats, 70; sheep, 70; pigs, 145.

J. M. SINCLAIR,

Chief Veterinary Surgeon.



# Southern Rhodesia Weather Bureau

JULY, 1928.

**Pressure.**—During the month the barometric pressure was high, varying from 0.043 in. above normal at Victoria to 0.011 in. above normal at Mazunga.

**Temperature.**—Mean temperatures were below normal, varying from 5.3 deg. F. below normal at Riverdene North to 0.5 deg. F. above normal at Sinoia.

Mean maximum temperatures were below normal, varying from 5.9 deg. F. below normal at Riverdene North to 0.5 deg. F. below normal at Salisbury.

Mean minimum temperatures were below normal, varying from 4.9 deg. F. below normal at Mount Selinda to 2.1 deg. F. above normal at Sinoia.

Relative humidity was generally below normal, varying from 17 per cent. below normal at Enkeldoorn to 8 per cent. above normal at Melsetter.

Frost appears to have been severe in parts, the lowest readings so far received being from Fort Victoria and Riverdene North, the temperature at Victoria reading 16.5 deg. F. and at Riverdene North 18 deg. F.

## WEATHER NOTES.

### Zone C.—

#### *Salisbury.*—

The mean pressure for the month was slightly below normal, there being four highs and three lows. There was no rain, but “guti” weather was experienced on the night of the 23rd. The month was generally fine, but cold, with little cloud. Ground frost was recorded on eight occasions, with the highest frost of the season on the 26th—4.6 deg. Strong winds occurred at the beginning of the month,

but for the rest of the month winds were moderate. Thick mists were observed on the 29th and 30th.

*Gatooma.*—

The month opened with strong easterly winds and low temperatures, which gradually gave way to much milder weather in the middle of the month. This was replaced during the third week with bitter southerly winds and a heavily overcast sky, which cleared during the last few days of the month. No frost was recorded.

**Zone E.**—

*Riverdene North.*—

This has been an exceptionally cold month, in fact the coldest since starting these records eight years ago. The maximum temperature was reached on the 16th, with 77 deg. registered, and the lowest on the 27th, with 18 deg. on ground. Frosts have been experienced every night save five on the ground. Winds have been fresh and fairly general, chiefly from the south-east quarter. These prevail during the day, but die down towards sundown, and in the early mornings often light airs from westerly quarter. A passing shower fell on the 3rd instant, and on the 23rd we experienced a day of "guti." The river Popotekwe still runs, but is visibly getting lower. The cold weather has been hard on the stock and grass, and cattle are beginning to show the effects, but there is still some good grazing in parts locally.

*Fort Victoria.*—

The month has been fine except for three days at Show time, when it was very bleak and cold, .06 of drizzling rain being recorded. An outstanding feature of the weather this month has been the severe frost, which has occurred on twenty-six nights, the most being on the night of the 28th, when the ground minimum thermometer registered 15.5 deg. Considerable damage has been caused in certain parts of the district by frost; crops that usually resist it, such as peas, have been ruined, and plant life is practically at a standstill. Ice has been frequently seen in the early mornings.

## RAINFALL.

## ZONE A.

## BULAWAYO—

St. Peter's Diocesan School ... ..	.04
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## GWELO—

Frogmore ... ..	.06
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Gwelo Gaol ... ..	.03
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## INSIZA—

Orangedale ... ..	.13
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## UMZINGWANE—

Springs ... ..	.06
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## ZONE B.

## BELINGWE—

Bickwell ... ..	.15
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## BULALIMA-MANGWE—

Garth ... ..	.06
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Maholi ... ..	.03
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Semokwe Reserve ... ..	.01
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Tjompani ... ..	.02
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## GWANDA—

Tuli ... ..	.12
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## INSIZA—

Albany ... ..	.09
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Inyezi ... ..	.25
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Scaleby ... ..	.18
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Wanezi Mission ... ..	.10
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## MATOBO—

Holly's Hope ... ..	.01
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Mtshabezi Mission ... ..	.09
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## UMZINGWANE—

Essexvale ... ..	.03
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## ZONE C.

## CHARTER—

The Range ... ..	.08
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## CHILIMANZI—

Beacon Hill ... ..	.02
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## GWELO—

Lyndene ... ..	.05
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## LOMAGUNDI—

Between Rivers ... ..	.01
Kashao ... ..	.06
Raffingora ... ..	.08

## ZONE D.

## INYANGA—

Juliasdale ... ..	.76
Rhodes Estate ... ..	.60

## MAKONI—

Eagle's Nest ... ..	.06
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## MAZOE—

Bellevue ... ..	.03
Glen Grey ... ..	.05
Ruia ... ..	.03

## MTOKO—

Makaha ... ..	.11
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## ZONE E.

## BELINGWE—

Belingwe N.C. ... ..	.08
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## BIKITA—

Angus Ranch ... ..	.05
Bikita ... ..	.34

## CHARTER—

Buhera ... ..	.03
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## CHILIMANZI—

Allanberry ... ..	.07
Driefontein ... ..	.11
Induna Farm ... ..	.08
Mtao Forest ... ..	.07

## GUTU—

Eastdale Estates ... ..	.05
Glenary ... ..	.06

## GWELO—

Partridge Farm ... ..	.12
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## INYANGA—

St. Trias' Hill ... ..	.23
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## MAKONI—

Mona ... ..	.30
Tablelands ... ..	.23
Springs ... ..	.16
Whitgift ... ..	.19

## MARANDELLAS—

Delta ... ..	.12
Elandslaagte ... ..	.06
Macheke ... ..	.03
Wedza Reserve ... ..	.14

## MELSETTER—

Brackenbury ... ..	1.10
New Year's Gift ... ..	.14
Sabi Tanganda Est. ... ..	.08

## NDANGA—

Doornfontein ... ..	.24
Zaka ... ..	.40

## SELUKWE—

Aberfoyle Ranch ... ..	.13
Impali Source ... ..	.13
Safago ... ..	.15

## UMTALI—

Alicevale ... ..	1.59
Argyle ... ..	.17
Jerain ... ..	.11
Park Farm ... ..	1.15
Premier Estate ... ..	.22
Sheba ... ..	1.61
Stapleford ... ..	.86
St. Augustine's Mission ... ..	.75
Umtali Gaol ... ..	.09

## VICTORIA—

Brucehame ... ..	.23
Cambria ... ..	.14
Cheveden ... ..	.41
Kimberley Ranch ... ..	.10
Mashaba ... ..	.33
Riverdene North ... ..	.19
Salemore ... ..	.30
Silver Oaks ... ..	.15
Stanmore ... ..	.11
Victoria ... ..	.06

## ZONE F.

## MELSETTER—

Chikore ... ..	.39
Lettie Swan ... ..	.53
Melsetter ... ..	.86
Mount Selinda ... ..	.68



Export of Cattle from Southern Rhodesia, 1928.

Month	Union		Eng-land.	Congo		N. Rho- desia	Portuguese East Africa.			Total
	Slaughter	I.C.S. for overseas		Slaugh- ter	Breeding		Slaughter	Trek	Breeding	
			Johannes- burg			On hoof				Slaughter
January	55	...	...	1,370	39	...	108	...	...	1,572
February	190	...	...	2,287	453	...	111	...	...	3,041
March	562	2,746	...	4,257	13	192	39	...	...	7,809
April	957	4,927	...	3,468	12	193	84	...	...	8,641
May	1,522	5,864	...	4,545	11	...	36	...	5	11,983
June	2,278	6,000	...	1,505	949	...	177	...	5	10,914
July	1,370	2,066	140	1,458	1,682	63	104	33	...	6,863
August	...	...	...	...	...	...	...	...	...	...
September	...	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...

J. M. SINCLAIR,

Chief Veterinary Surgeon.

# Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Sept.	October.
Ayrshire—Sipolilo	Various farms	G. H. Cautherley	1928	1928
Banket Junction	Banket Hotel	A. M. Hutchinson	8	13
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	7	5
Bindura	Bindura Farmers' Hall	W. E. Fricker	27	25
Bromley	Farmers' Hall, Bromley Siding	E. Somerville-Collie	14	12
Bubi	Queen's Mine	C. H. Olsen	5	3
Chakari	Dodington (Sept.), Eastern Sect. (Oct.)	L. T. Tracey	11	9
Daisyfield	Somabula (Sept.), Daisyfield (Oct.)	L. E. Edwards	19	17
Darwendale—Trelawney	Various farms	C. S. G. Budge	8	20
Eastern Districts	Farmers' Hall, Chidza	W. E. Richards	26	24
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	8	13
Enterprise	Farmers' Hall	James Watson	4	2
Essexvale	Essexvale	Col. D. Judson	4	2
Felixburg—Gutu	Various farms	A. J. Bradshaw	16	21
Figtree Branch, R.L. and F.A.	Figtree Hotel	The Secretary	8	13
Gadzema	Gadzema	M. G. Leahy	4	2
Gatooma	Speck's Hotel	B. L. Henderson	14	12
Gatooma (Golden Valley Branch)	Golden Valley Hotel	C. A. K. Beaton	15	20
Gazaland (South Melssetter)	Chipinga Hotel	Mrs. C. N. Reading	8	13
Greystone	Quarrie Farm	P. J. van der Walt	3	1
Gwanda	Timber Farm (Mr. N. J. B. Nilson)	N. B. Nilson	8	...
Hartley	Old Schoolroom, Hartley	E. Etheredge	No fixed	dates
Headlands	Headlands	J. A. Eve	22	27
Hunter's Road	Hunter's Road	J. W. Watkinson	...	...
Inisa South	Farm Lancaster	J. Campbell	29	27
Inyazura	Inyazura	W. P. Frudd	13	11
Lalapansi	Lalapansi	Edmund Chapman	...	5
Lomagundi	Sinoia	F. W. Robertson	8	13
Lomagundi West	Various farms	T. W. Williamson	...	12
Macheke	Farmers' Hall, Macheke	The Secretary	30	28
Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	T. R. Colam	...	...
Makwiro	Makwiro	F. H. Howard	1	6
			21	19

Makoni	-	-	-	Rusape	-	-	-	R. Munch	1	6
Marandellas	-	-	-	Marandellas Farmers' Hall	-	-	-	E. Cruikshank	7	5
Marandellas, Southern	-	-	-	Various farms	-	-	-	D. L. Gale	5	3
Mashonaland	-	-	-	Mashonaland Farmers' Hall, Salisbury	-	-	-	C. Lamb	14	12
Matabeleland Landowners' Farmers and Cotton Growers' Association	-	-	-	Library Buildings, Bulawayo	-	-	-	W. A. Carnegie	13	11
Matopo Branch, R.L. and F.A.	-	-	-	Farmers' Hall, Malundi	-	-	-	W. Mirtle	15	20
Mazoe (Concession)	-	-	-	Concession Hotel	-	-	-	Frank Allen	14	12
Mazoe (Glendale)	-	-	-	Farmers' Hall, Glendale	-	-	-	E. McNulty	12	10
Melsetter	-	-	-	Court House, Melsetter	-	-	-	Dr. Rose	13	11
Midlands Farmers and Stockowners	-	-	-	Royal Hotel, Gwelo	-	-	-	T. R. van Rooyen	12	10
Ngezi-Umniati	-	-	-	Harvieston, Enkeldoorn	-	-	-	Miss Harvie	29	27
North Umriati	-	-	-	Norton	-	-	-	J. F. Eagar	Not received	
Norton and Lydiat District	-	-	-	Nyamandhlovu	-	-	-	R. D. Palmer	7	5
Nyamandhlovu	-	-	-	Odzi Hotel	-	-	-	R. D. McLean	...	12
Odzi District Farmers	-	-	-	Various places	-	-	-	F. H. Burnett	...	6
Poorte Valley	-	-	-	Offices of the Que Que Sanitary Board	-	-	-	A. D. Wilson	15	20
Que Que	-	-	-	Various farms	-	-	-	J. Hogg	15	20
Salisbury South	-	-	-	The Hotel, Selukwe	-	-	-	P. Linton	26	31
Selukwe	-	-	-	Shamva Hotel	-	-	-	W. T. Simpson	7	...
Shamva	-	-	-	Various farms	-	-	-	W. Stanley-Stollard	20	18
Two Rivers Farming Association	-	-	-	Various farms	-	-	-	W. L. Parsons	15	20
Umboe (Branch of Lomagundi F.A.)	-	-	-	Various farms	-	-	-	A. Greenway	8	...
Umvukwe Farmers' and Tobacco Growers' Association	-	-	-	Various ranches	-	-	-	E. Wrightson	8	13
Umtali	-	-	-	Drill Hall, Umtali	-	-	-	A. Howat	6	4
Umvuma and District	-	-	-	Umvuma	-	-	-	H. B. Colling	Not received	
Victoria	-	-	-	Victoria	-	-	-	G. E. Lamb	1	6
Wankie District	-	-	-	Plumtree Hotel	-	-	-	W. Brownlee-Cumming	Not received	
Western	-	-	-	Willoughbys	-	-	-	The Secretary	8	13
Willoughbys	-	-	-	Willoughbys	-	-	-	A. E. Roberts	Not received	



## Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
De Grendel Rita	Friesland	3,122.00	...	90	C. A. Blackwell, Norton
Home Park	do	6,327.50	...	210	R. G. Fox, Umtali
Mary III.					
Home Park	do	5,147.25	...	150	do do
Elske V.					
Home Park	do	5,207.00	...	150	do do
Alma V.					
Home Park	do	3,371.50	...	90	do do
Agnes					
Rathwick	do	3,442.50	...	150	do do
Princess IV.					
Rathwick	do	5,074.00	...	150	do do
Maud III.					
Rathwick	do	5,553.00	...	150	do do
Mermaid					
Umtali Nereid...	do	3,103.25	...	120	do do
Umtali Queen ...	do	2,797.25	...	90	do do
Umtali Mary ...	do	2,194.50	...	90	do do
Dapple ...	do	2,041.00	...	60	A. T. Holland,
					Chatsworth
Princess ...	do	1,772.00	...	60	do do
Rhoda ...	do	938.00	...	30	do do
Mary ...	do	1,002.00	...	30	do do
Palm Tree Milly	do	9,151.00	...	431	M. Inge, Sinoia
Palm Tree Neeltje	do	7,131.00	...	301	do do
Palm Tree	do	6,117.00	...	263	do do
Buttercup					
Palm Tree Ethel	do	5,021.00	...	199	do do
Langton Nessie	do	1,983.00	62.03	98	do do
Langton June...	do	1,599.00	48.30	73	do do
Langton Daisy	do	520.00	16.64	25	do do
Erin-go-bragh...	do	866.50	...	30	W. S. Mitchell,
					Iron Mine Hill
Sally ...	Grade	7,701.50	...	360	C. E. Strickland,
	Friesland				Shamva
Jane ...	do	7,225.00	...	330	do do
Betty ...	do	7,240.75	...	330	do do
Freesia ...	do	1,923.50	...	60	do do
Mona ...	do	1,514.75	...	60	do do
Poppy ...	do	773.00	...	30	do do
Julia ...	do	816.50	...	30	do do
Kate ...	Grade	1,875.25	...	90	do do
	Shorthorn				
Groenvlei	Friesland	4,669.05	...	120	P. T. Webb,
Bedford Alberta					Iron Mine Hill
De Grendel Bessie	do	8,792.00	260.93	245	Gwebi Experiment Farm
De Grendel	do	6,825.50	199.16	173	do do
de Hoop					

## RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.	
De Grendel Roza	Friesland	4,449.25	108.21	165	Gwebi Experiment Farm	
De Grendel Froukje	do	6,475.25	166.93	157	do	do
De Grendel Selma	do	5,402.50	146.14	119	do	do
De Grendel Laura	do	2,497.00	68.02	84	do	do
Flora of Elsmore	do	5,069.50	177.33	205	do	do
Wit Fancy ...	do	5,081.00	147.96	205	do	do
Pel Fancy ...	do	4,649.00	145.95	149	do	do
Mimosa Pel Stiensers	do	4,504.75	153.67	181	do	do
Mimosa Clara II.	do	4,583.00	141.53	126	do	do
Mimosa Clara X.	do	2,012.50	54.53	28	do	do
Melrose Corrie...	do	2,797.00	66.09	66	do	do
Janie ...	Grade	8,000.00	258.89	308	do	do
	Friesland					
Antbloem ...	do	6,215.75	162.14	227	do	do
Fanny ...	do	8,337.75	255.25	241	do	do
Lucy ...	do	4,798.75	130.50	181	do	do
Katie ...	do	4,930.75	147.75	161	do	do
Kleinbloem ...	do	4,596.50	134.45	149	do	do
Gwebi Waterbloem	do	2,886.00	89.27	149	do	do
Gwebi Janie ...	do	1,262.75	48.72	70	do	do
Hannah ...	do	6,579.25	198.50	149	do	do
Gladys ...	do	1,005.50	25.84	21	do	do

# Farming Calendar.

## September.

### BEE-KEEPING.

This is an important month for the bee-keeper, as it starts the first flow of the season. All hives that were sent into winter quarters on a double brood chamber, or otherwise with ample food for that period, should now be overflowing with young in all stages and with a population large enough to take full advantage of the flow. All hives should be carefully examined now and again, entrances opened out to suit the advancing warmth of the weather, and where necessary ventilator lids replaced on the top crates under the hive lid. See that no worry is caused to the bees by ants getting up, and that ample stores of good water (with a pinch of salt and a dash of vinegar) are available for drinking purposes, of which bees consume quite a lot. Swarms can now be looked for; if not required, they can best be destroyed by carbon bisulphide or calcium cyanide—both requiring very careful handling. If it is wanted to increase the apiary, as soon as the scouts are seen looking round for a home, get the decoy hive ready filled with dummy and proper frames of full foundation sheets, or, better still, if they are available, old drawn out brood combs, and as soon as it is taken possession of, insert if possible a frame or two of unsealed brood. As a rule the swarm will settle down at once. Such a colony is best placed in the apiary the same evening, if it can be so arranged. Do not make the mistake so often seen of supplying the new colony with starter frames only; give them full foundation sheets; it pays every time, and more especially so in the first early honey flow. Be sure also and protect the apiary against that persistent robber, the honey bear or ratel, by fencing it with fowl netting and pegging that down with wooden pegs every two feet. The two-footed robber can be just as effectively dealt with by placing a small light chain round the entire hive fastened with small staples and a padlock.

### CITRUS FRUITS.

The fate of the citrus fruit crop is dependent upon the treatment the trees receive during this month. If the trees have received the treatment recommended in the August calendar, and this treatment is followed by good irrigations and cultivation, a good crop of fruit can be expected, whereas a total failure may be the result if the trees suffer for want of moisture at this season of the year.

If not already done, all top worked trees should be headed back early in the month. This cutting back will induce the dormant buds (set in autumn) to commence growth. As the new shoots develop the old tops may be further shortened back until the old top is displaced with a new profitable one.

The packing of late varieties must be speeded up and completed by the end of the month if possible, as the late packed fruit is likely to deteriorate in quality or come into competition with Mediterranean fruits.



All adventitious shoots (water shoots and suckers) must be cut off as they appear, and this work should be continued throughout the growing season.

### CROPS.

From now onwards there should be no further danger of frost, and crops that are susceptible to low temperatures may be planted where moisture is available. Such are potatoes and Jerusalem artichokes, onions in beds for the main summer crop and early maize and pumpkins in vlei lands.

Ploughing, cross-ploughing and the treating of land with farmyard manure will be continued and the fields will be got into the best possible tilth preparatory to sowing. Where this has been done, and check-row planting of maize is practised, the holes can be prepared at the requisite distance apart.

Early varieties of winter cereals will be ripening and the harvesting of these will commence.

### DECIDUOUS FRUITS.

Newly planted trees must not be permitted to become too dry; watering by hand or gravitation must be continued until the rains commence. Ten gallons of water every fourteen days are sufficient for young trees; these applications should be followed by the loosening of the soil to prevent undue evaporation of the added moisture.

All undesirable growths on the stem and in the centre of the trees should be suppressed as they appear; this will enable the retained shoots to develop normally.

Early fruits must be thinned out this month; only retain two or three fruits on each bearing twig or shoot. Those that are left will then develop into large and attractive fruits.

### ENTOMOLOGICAL.

Cotton.—Prevention for most of the boll-worms will be the proper preparation of the ground, with thorough cultivation and eradication of all weeds on the land, particularly those of the family Hibiscus. Wild host plants for stainers should be sought out and destroyed.

Tobacco.—Young plants in seed-beds may suffer from cutworms. Frequent cultivation and laying down of poisoned bait—50 lbs. bran and 21 lbs. Paris green; bring to consistency of a stiff dough, adding water when necessary. Distribute this over the seed-beds in the forenoon, as the cutworm does most of its feeding at night. The beds should be thoroughly burnt over with wood or dry tobacco stalks to ensure that the seed-beds are free from cutworms, and baiting for any coming in from the surrounding ground should then be resorted to when the plants appear. Clear the ground for some distance round the beds, say 30 yards in all directions, and bait this ground thoroughly before sowing—this clearance allows a wide margin over which the cutworms would have to travel. Cutworms' moths are nocturnal in habit, so that the coverings of the beds need to be moth-proof at night; this should be seen to each evening.

Potato.—Early potatoes are liable to suffer from caterpillars. The crop should be sprayed at first sign of injury with an arsenical wash.

Cabbage.—During this month the most prominent enemies of plants of this family are diamond-back moth and web-worm. Cabbage louse is sometimes troublesome. The young plants may be sprayed or dusted with an arsenical compound for the former, and sprayed with tobacco wash and soap for the latter.

Beans.—Planted under irrigation during September usually escape serious infestation with stem maggot.

Citrus.—Throughout the month lime-sulphur spray (1-100) may be used to control yellow citrus thrip whilst on very young fruit. A useful spray against black aphid and thrip is the following:—Nicotine, 9 ozs.; Capex spreader, 7 ozs.; water, 100 gallons; Capex lime-sulphur, 1 gallon. This may be sprayed or fumigated against scale insects, having regard, however, to presence of fruit and blossom. Spraying and fumigating for scale should not be carried out whilst trees are in blossom. Clear young growth of aphid previous to blossoming, using nicotine, tobacco wash or Derris.

#### FLOWER GARDEN.

Cultivate extensively to prevent evaporation and to keep weeds in check. Water plants newly set out, especially such as have their roots near the surface. Thin and regulate growing shoots on roses and various shrubs. Plant out cannas and chrysanthemums (for massing and border decorations) and other herbaceous plants.

#### VEGETABLE GARDEN.

Sow French beans, leek, spinach, cucumber, egg plant, celery, rhubarb, melons and tomatoes. Small sowings of peas, turnips, beet, lettuce, radish, carrot, parsnip may be made now.

#### FORESTRY.

All cuttings struck in sand in July and not yet transplanted into good soil should have this done as soon as possible. Tentative sowings of gum seeds should now be made on a small scale, so that transplants will be ready in case the first half of the rainy season should prove favourable; otherwise, bulk sowings should be postponed to October-November.

#### GENERAL.

Indigenous labour is apt to become more scarce at this time of the year, the boys returning to their kraals to break up the land for next season. Stock are liable to stray in search of the young grass now coming up, and much trouble from this cause is to be looked for on unfenced farms. Natives are now cultivating their gardens preparatory to sowing their crops, which they do much earlier than do Europeans. The mischief caused by veld burning becomes apparent from this time onwards in the condition of the stock, and it is necessary frequently to move them away in search of grazing.

#### POULTRY.

The supply of green food to the birds must be kept up; in fact, during the hot weather they require more.

During our dry season the available supply of such green foods as lettuces, cabbages, sunflower leaves is much reduced, but there are many others that can be used, such as belhambra, plumbago, wild cockscomb, plantain leaves, paw-paw leaves, etc. Sprouted oats, barley and wheat should also be used. Many of the young cockerels should now be fit for killing. Keep the best and get rid of the remainder. It is very advisable to caponise all young cockerels when about 2½ lbs. weight. Bulletin No. 517 gives clear and concise details as to the method of performing the operation. Some of the earliest hatched young pullets, i.e., those hatched in April, should show signs of commencing to lay now. No light breed bird should lay until it is 5 to 5½ months old, or a heavy breed until it is 6 to 6½ months old. Should any show signs of commencing to lay before this, they should be moved from run to run to prevent their doing so. A bird that lays before it is fully matured will stop growing, will always be small, and its eggs will for its first year of laying also be small.

When the pullets are four months old, i.e., those of the light breeds, they should be put into their permanent laying quarters, and those of the heavy breeds when they are five months old. A bird that is moved after it has started to lay will stop and very probably go into a moult.



See that young ducklings get plenty of shade during the hot weather. Those destined for killing should not be allowed free range or even a medium-sized run, but should be kept fairly crowded in small runs. It is necessary to get the flesh on them as quickly as possible, and the more rest and less exercise they have, the more rapid will be the growth, and also more succulent and tender the flesh.

The hatching of turkeys should proceed rapidly and be carried on until the end of the dry season. See that they have plenty of chopped onions or onion tops or eschalots, and thick separated milk. These are absolutely necessary if the turkey breeder wishes to be successful with his rearing. Do not give wet food; dry mash such as given to chickens is the better.

#### STOCK.

Cattle.—Ranching cattle should require little now in a normal season; it is only in the event of very late rains that trouble should be expected. Where possible, it will be wise to keep an eye on those cows that may be expected to calve early, with a view to feeding them if necessary, and seeing that they do not get too poor. The dairyman will carry on much as in August; he will, however, use his discretion (in accordance with the condition of his veld) as to the use of ensilage, pumpkins or other bulky and succulent food. He will be wise not to shorten the supply of concentrated foods for some time to come. A little hay or ensilage should still be kept in reserve until the rains have fallen in reasonable abundance.

Sheep.—The remarks for August apply. If spring lambs are expected, it will be wise to see that the sheep shed is in good order—clean, dry, properly drained and airy. Watch that the ewes shall not be poor when they lamb, and remember that they cannot rear good lambs if the veld is bad, but must have their grazing supplemented, just as milk cows are fed in order to produce milk.

#### TOBACCO.

Begin sowing seed beds each fortnight for the acreage proposed to be planted; fertilise and stimulate growth so as to be ready for planting out should rain come early in November.

#### VETERINARY.

There should be very few deaths from redwater and gallsickness this month. Cases of vegetable poisoning of stock picking up tempting young green shoots of dangerous character on the burnt veld are of frequent occurrence. Sheep can be inoculated against blue tongue, but ewes in lamb should not be treated, on account of the danger of abortion. Scab may be prevalent.

#### WEATHER.

The temperature may be expected to rise steadily during this month. Rains are not due until next month, though the average over a period of years shows slightly more than in the previous four months, and ranges between .1 and .5 inch. Frost has been known to occur in September, although this is a very unusual event. Rain-gauges should be seen to before the rains commence. They should be carefully adjusted to stand exactly level with the lip four feet above ground, and care should be taken that no tree, building or other obstruction interferes with the fair precipitation of rain into the orifice.



## Feeding Bullocks at Gwebi.

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In the article in the July number of this Journal on "Feeding Bullocks at Gwebi," it is stated, under the sub-heading "Second Period in the Pen," that the bullocks receive "6 lbs. of a mixture of crushed maize and sunflower head meal per head per day." It should have been stated that the ratio of crushed maize to sunflower head meal is narrower in this case than during the first period on grass, when it is stated as being 6 : 1. (This latter ratio is too wide and should be about 4 : 1.) During the period in the pen the ratio should be narrowed down gradually until it is about 3 : 1. At the present moment (end of July) the following is the concentrate ration being fed to the bullocks:—

A mixture compounded in the following proportions:—

500 lbs. crushed maize.

125 lbs. sunflower head meal.

100 lbs. ground nut cake.

To the dairy cows the present ration fed is compounded as follows:—

250 lbs. crushed maize.

100 lbs. ground nut cake.

100 lbs. sunflower head meal.

S.D.T.

## Seed for Sale, 1928.

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	s.	d.
Salisbury White Maize, 2nd quality, per 100 lbs.	12	6
Kinvarra Oats ... .. per 100 lbs.	25	0
Linseed (Flax J.W.S.) ... .. per lb.	0	6
Boer Manna ... .. per lb.	0	4
Red Manna ... .. per lb.	0	4
Majorda Seed ... .. per lb.	1	0
Sunflower (Large Black) ... .. per 100 lbs.	15	0
Sweet Potato Slips ... .. per bag	5	0
Napier Fodder Roots ... .. per bag	5	0
Kikuyu Roots ... .. per bag	5	0

Prices are f.o.r. Gwebi. Before sending cheques, intending purchasers are advised to ascertain that the seeds required are still available. Cheques should be made payable to "Gwebi Farm." Orders and enquiries should be addressed to the Chief Agriculturist, Salisbury.

*Note.*—When remitting money in payment of seeds, etc., to assure prompt dispatch, it is necessary that railage should be included when goods are to be railed to a siding.

## Notes from the "Gazette."

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"Gazette"  
Date.

Items.

### DISTRICT ROAD.

- 3.8.28. The following has been declared as a district road in terms of section 2 of the "Road Regulations, 1896":—From a point on Blairnairn Farm; thence running in a north-easterly direction across that farm and the farm Achnashie, Crown land, Craigendcran, Westacre, Braidwood, Guides, Stonedale, Lorn, Haig, Wallacedale, Sheerbrook, Crown land, to Odzi Village. (G.N. No. 511.)

### POUND.

- 3.8.28. The pound established under Government Notice No. 44 of 1910 on the farm Dunning is abolished, and a pound has been established on Bickwell farm, Belingwe district. (G.N. No. 510.)



## Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

### AGRICULTURE AND CROPS.

- No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
- No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
- No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
- No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
- No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
- No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
- No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 374. Fibre Crops, by J. A. T. Walters, B.A.
- No. 388. Kudzu Vine, by H. G. Mundy, F.L.S.
- No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
- No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
- No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
- No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
- No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
- No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters, B.A.
- No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.
- No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.
- No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.
- No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 539. Barley Growing.
- No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
- No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.
- No. 550. Onion Growing under Irrigation, by C. Mainwaring.
- No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
- No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
- No. 591. Maize Export Conference Proceedings.
- No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
- No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
- No. 601. Maize for Export, by S. D. Timson.

- No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 616. The Ground Nut or Monkey Nut, by C. Mainwaring.
- No. 627. The Growing of Potatoes in Southern Rhodesia (Revised), by C. Mainwaring, Agriculturist.
- No. 630. The Storage of Seed Potatoes, by H. C. Arnold.
- No. 634. Barley, by P. V. Samuels.
- No. 643. Noxious Weeds in Southern Rhodesia, by F. Eyles, Botanist.
- No. 650. Coffee Culture in Southern Rhodesia, by G. W. Marshall, Horticulturist.
- No. 651. Two Important Leguminous Crops: The Velvet Bean and Dolichos Bean, by C. Mainwaring, Agriculturist.
- No. 656. Tractor Notes, by A. W. V. Crawley, M.E., F.G.S.
- No. 657. Hay-making in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 663. The Use of Fertilisers and Manures in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.
- No. 672. Hay-making in Rhodesia, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 674. Top Dressing of Maize against Stalk Borer, by H. C. Arnold.
- No. 681. The Sunflower (*Helianthus Annuus*) (Revised), by S. D. Timson, M.C., Dip.Agric.
- No. 684. Warning to Maize Growers: Maize for Export.
- No. 694. The Edible Canna (*Canna Edulis*), by D. E. McLoughlin.
- No. 695. The Castor Oil Plant (*Ricinus* spp.), by S. D. Timson, M.C., Dip.Agric.
- No. 697. Results of Analysis of Samples taken under the "Fertilisers, Farm Foods, Seeds and Pest Remedies Ordinance" during the year 1927-28.
- Botanical Specimens for Identification.
- Maize Grading Regulations.

#### REPORTS ON CROP EXPERIMENTS.

- No. 94. Second Report on Experiments, by J. H. Hampton.
- No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
- No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
- No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
- No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
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 No. 702. Book-Keeping on the Farm, by T. J. Needham, Acting Accountant, Agricultural and Veterinary Departments.  
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# THE RHODESIA Agricultural Journal.

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*Editor* - - *William E. Meade.*

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[No. 10

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## Editorial.

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*Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—  
The Editor, Department of Agriculture, Salisbury.*

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**The Farming Calendar.**—Readers whose perusal of the Journal extends to the latter pages of our publication will observe that in the present issue we publish the Farming Calendar for the months of October and November. We do so in response to representations made by a number of subscribers who, appreciating the value of these notes, point out that, owing to their copy of the Journal not reaching them until the month is well advanced, they are unable to give effect to the advice given. We are very pleased to receive notification that this feature of the Journal is so widely read and acted upon, and we commend what is written to the attention of those who have not scanned it previously.

We shall in future publish the Farming Calendar one month ahead, that is to say, the October issue will contain

seasonal notes for October and November and the November issue notes for November and December, and so on.

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**Importation of Cotton.**—Attention is directed to Government Notice No. 587 of 7th September, which we publish at the end of this issue of the Journal. It will be seen that the importation of cotton seed and seed cotton—by which latter is meant cotton fibre with the seeds adhering—into Southern Rhodesia from places outside British South Africa is limited to introductions made by or under the direct supervision of the Minister of Agriculture and Lands and is subject to such restrictions and conditions as he may deem necessary. Within British South Africa, by which is meant the British Possessions and Protectorates south of the Zambesi River, a permit is necessary to import cotton seed or seed cotton into Southern Rhodesia, the granting of which is at the discretion of the Minister of Agriculture and Lands. No ginned cotton may be introduced into the Colony except under the authority of a permit granted by the Minister of Agriculture and Lands.

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**District Exhibits.**—We are afraid that the illustration on the opposite page does not do justice to the excellence of the exhibit staged by the Mashonaland Farmers' Association at the recent Salisbury Show. It does, however, convey some idea of the diverse nature of the exhibits and the splendid manner in which they were staged. For this reason we feel justified in reproducing the photograph, and in doing so wish to congratulate those hard working ladies and gentlemen who, in the face of remarkably keen competition, obtained premier honours for their district. The other districts represented were Shamva, Fort Victoria, Marandellas and Umtali, and it is safe to say that no section of the Salisbury Show attracted more attention and favourable comment than did these displays.

It is to be hoped that such displays will continue to be a feature at our principal shows, for there is no better way of demonstrating the capabilities of the farming areas of the Colony than by this means. They also encourage that spirit





Salisbury district exhibit at Salisbury Show (see opposite).



Root section of the Department of Agriculture exhibit at Salisbury Show.





of co-operation which is so essential for success in farming practice to-day and may well form the nucleus of endeavour in other directions. We are aware that the staging of such an exhibit entails a great deal of preliminary preparation and self-sacrifice on the part of those responsible, but we are sure that the result is well worth the effort and we hope to see even keener competition next year.

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**Better Farming.**—There are two items in this issue of the Journal to which we direct particular attention. One is the letter from Mr. W. H. McFadzean bearing the above heading, and the other is the article entitled “Sand Veld Farming and its Possibilities,” by Mr. E. D. Alvord, Agriculturist for Instruction of Natives. Each records the beneficial results obtained from the adoption of a definite system of crop rotation and manurial treatment of the soil and is further testimony to the efficacy of the doctrine preached by the Department of Agriculture for many years.

It is fully realised that a number of farmers are endeavouring to carry out systems of cropping and manuring such as those described, but all too many are either not doing so at all or at best are doing so in a perfunctory manner. On how many arable farms in Rhodesia does one see the kraals well supplied with litter in order to augment the manure supply? On very few, we fear; yet this is a perfectly simple and inexpensive process. If by using manure and artificial fertiliser the average maize yield can be increased by 100 to 200 per cent., as has been done by Mr. McFadzean, then without reducing the total farm output of maize a portion of the lands can be thrown out of maize and into green manuring, and these in their turn will again give increased yields the following season. Thus the land which each season can be treated with kraal manure can, by its increased yield of maize, be made to compensate for the areas temporarily thrown out of maize while being green manured. The results obtained at Domboshawa school and on Chindamora Reserve, where very indifferent sand veld soil has been made to yield  $17\frac{1}{4}$  bags of maize per acre, speak for themselves, and there is no need for us to add anything to what is written.

Shelling of the maize crop on the Gwebi farm is now completed, and those farmers who were present at our Farmers' Day in March last will be interested to learn that the average maize yield over 412 acres has proved to be a fraction over eleven bags per acre in spite of a season which was far from favourable.

We may add that since that Farmers' Day the Chief Agriculturist and his staff have drawn up rotational cropping and manuring systems for a number of farmers who at long last have decided to put such a programme into effect. It is hoped that many more farmers will avail themselves of the assistance which can thus be given them, and that others already carrying out crop rotations and soil treatments such as are described by our correspondent will give readers of the Journal the benefit of their experience.

**Afforestation in Southern Rhodesia.**—Towards the end of February last operations were commenced in the newly acquired Stapleford Reserve. This reserve, which has an area of 18,477 acres, is situated on the eastern border of the Colony in the Umtali district. Soil and climate in this beautiful mountain district are pre-eminently suited to the growing of high class timber of both hard and soft woods, and it is hoped in course of time to plant some 15,000 acres with trees. The policy of the Government is in accordance with that adopted by other countries, viz., that in view of the world shortage of soft woods to afforest as large an acreage as possible with these timbers with the main object of rendering the Colony ultimately self-supporting in this respect. The species of conifers (soft woods) being planted extensively consist of *Pinus insignis*, *Pinus patula*, *Cupressus lusitanica* and *Cupressus torulosa* as the main crop, but many other conifers are also being grown. On a smaller scale such hard woods as *Eucalyptus saligna*, *Eucalyptus microcorys* and *Eucalyptus paniculata* are being planted. It is intended to plant between 500 and 600 acres during the coming season, and already nearly three quarters of a million transplants have been raised. It is no exaggeration to say that a million acres of land on the eastern border are suited to the successful growing of soft woods, so that this Colony is potentially





Melrose Clara, champion female Friesland and best dairy cow on Salisbury Show. Exhibited by Government Farm, Gwebi.



Tuesley 2nd of Selby, champion female on Salisbury Show, 1927 and 1928. Bred and exhibited by Mr. Duncan Black.



capable of being able in years to come to develop a considerable export trade in this respect.

On the Mtao Forest Reserve, comprising some 15,000 acres in the Chilimanzi district, work of extraordinary value to the major portion of the Colony has been and is being carried out. The hardier types of hard and soft woods have been tested and proved suitable to propagation on a large scale where soil of sufficient depth is available. During the last five years nearly 1,000 acres have been afforested with 80 per cent. of hard woods (eucalypts) and 20 per cent. of conifers (soft woods). On this large area careful and efficient fire protection has been carried out and the value of such measures is brought home with increased force each year. The main consideration is the preservation and accumulation of organic matter, resulting in increased soil moisture, without which successful tree growth is a gamble. Now that the experimental stage is past, it is intended to extend operations at Mtao in order to cover about 750 acres during the coming season.

The policy of the Government in each of these areas is to build up an asset which will be of very material benefit to the Colony in the future, and it is hoped, should the necessary funds become available, to increase considerably the operations now in progress.

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**The International Beef Trade.**—The position in regard to the international beef trade continues to be full of interest and possibilities. There appears to be a real scarcity of prime beef and mutton in the United States of America owing to the population having outstripped production. Whether the shortage will be made up by increased production within her borders or whether America will in future have to import a larger proportion of her beef requirements remains to be seen. From what can be gathered it appears probable that the latter course is likely to be pursued.

It is stated in *The Imperial Food Journal*, which is usually well informed on these matters, that notices are posted in American restaurants asking people to eat less meat, with the result that the *per capita* consumption of beef in 1927 in the United States was, by propaganda, reduced



to 58 lbs., as compared with 63.3 lbs. in 1926; of veal 7.4 lbs., as against 8.2 lbs., and of mutton and lamb 5.4 lbs., compared with 5.5 lbs. Thus in beef, which figures largest in fresh flesh dietary of the American household, there was a falling off in consumption equal to nearly 10 per cent.

The United States last year imported 35,000,000 lbs. of fresh beef, compared with 16,000,000 lbs. in 1926, and 7,500,000 lbs. of veal, as compared with less than 4,000,000 lbs. in 1926. In addition, 283,004 cattle on the hoof were imported from Canada.

The writer in *The Imperial Food Journal* expresses the opinion that it is not likely that the United States will maintain its barrier against Argentine beef for long. Thus, if the United States were to take only five per cent. of its meat supply from Argentina, that would reduce by one-third the total amount of Argentine meat which would be available for export to Great Britain. Seeing that nearly 700,000 tons of Argentine beef are annually consumed in Great Britain, the tremendous importance of any such shortage in the near future is clearly apparent.

It therefore behoves us as a potential source of supply for the British market to take stock of our position with a view to being ready to participate in this trade when opportunity arises. A condition precedent is certainly the improvement of our herds, and the key to the position is "more and better bulls." There is probably no portion of the British Empire which possesses the natural advantages for raising prime cattle that Southern Rhodesia does, and in spite of the difficulties and setbacks experienced in the past we believe that the cattle owner in this Colony who breeds the right kind of stock will find it a profitable undertaking.

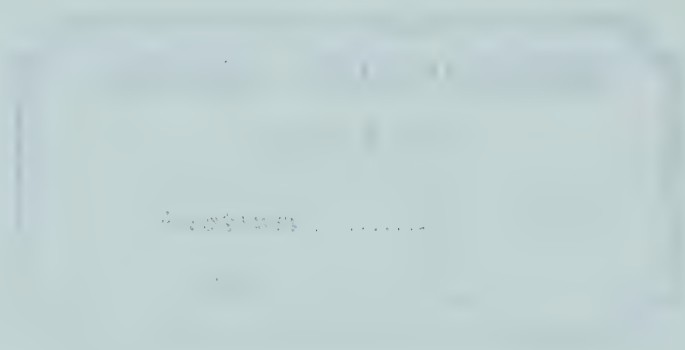
In trying to analyse the position it is well that we should take note of the fact that there has been a gradual change in the taste for meat in Europe during late years. It is in the direction of smaller joints. The demand for hind-quarters in comparison with forequarters has become stronger since the Great War. This is due to the changed social conditions since the war, brought about by the growth of motor-ing, the greater popularity of picnics, the extension of flat life, cooking with electricity, the enormous increase in the number of women in business, smaller families, and the



Champion ox at the Salisbury Show, 1928, bred by Mr. J. R. Stewart, Shangani. This ox was taken out of the prize-winning pen shown below. Age under three years.



Prize-winning pen of slaughter oxen at Salisbury Show, bred and exhibited by Mr. J. R. Stewart, Shangani. These oxen realised £18 each at the show sale. The slaughter classes were a feature of the Salisbury Show.





generally more varied social life now enjoyed by the people—which are said to have resulted in an increase in the consumption of prepared foods and the popular demand for cuts suitable for frying.

Since the above notes were written, a cablegram has been received from London stating that the consignment of Rhodesian cattle which left here in July arrived at Birkenhead in excellent condition, no casualties having occurred during the voyage. It is stated that this was the best consignment of cattle yet shipped from Africa and that the quality was above the average run of English cattle. We are advised that nineteen realised £483 19s. 1d.; twenty-five £649 7s. 9d.; ten £282 5s. 1d.; ten £236 17s. 11d.; thirty-six £830 5s. 1d.; nine £178 8s. 7d.; twenty-one £466 0s. 1d.; ten £240 6s. 10d. Although these prices return the breeders a useful margin over expenses, if this consignment could have been sent earlier in the year it would have reached the market before it was supplied with English and Scotch cattle off the grass, and prices would probably have been greater.

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**The British Empire Dairy Industry.**—Some interesting facts and figures are given in an article written for *The Imperial Food Journal* by Major Russell King, D.S.O. He tells us that, according to the records of the Imperial Economic Committee, milk consumption in 1923 was about nineteen gallons per head of the population in Great Britain, whereas in the United States it is double the above amount, and in Denmark and Sweden three times that quantity; or over one gallon per head for each week of the year.

Butter and cheese statistics of production in Great Britain are not available, but the Ministry of Agriculture's estimate is in the neighbourhood of 1,000,000 cwts. of butter, and 1,250,000 lbs. of cheese for Great Britain and Northern Ireland. The home production of butter, therefore, is only about one-sixth of the total consumption.

The percentages of butter and cheese produced in the United Kingdom and imported from the Empire and from foreign countries during 1924 are as follows:—

				Overseas.		
				Home.	Empire.	Foreign.
Butter	...	...	...	17%	37%	46%
Cheese	...	...	...	31%	60%	9%

For five years ending 1904 the average annual imports of butter into the United Kingdom totalled 193,500 tons; in 1925 this had risen to 290,000 tons. In the interval the Empire supply rose from 18 per cent. to 51 per cent. of the total imports. The imports of cheese for the same five years averaged 131,000 tons; in 1925 this had risen to approximately 150,000 tons, of which 130,000 tons were Empire and 20,000 tons foreign.

The Empire's main competitors in dairy produce are Denmark, Siberia, Baltic Provinces and Holland. The Argentine also exports butter to Great Britain, but Major King does not anticipate that she will ever be a very serious competitor.

He goes on to inform us that for the past four or five years Irish butter has been almost driven off the English market, but to-day it is in a much better position. Last year the Free State increased her butter trade with the United Kingdom by 90,000 cwts. Export of Irish butter last year was valued at £4,560,157. To show how the Free State has increased her production during the past two years, in 1926 her exports were 496,245 cwts., and in 1927 586,485 cwts. In 1927 the number of milking cattle in the Irish Free State totalled 1,235,417.

The production of dairy produce in Canada for 1926 totalled:—

178,156,375 lbs. of butter valued at \$62,025,049.

170,633,781 lbs. of cheese valued at \$28,673,160.

3,951,335 milking cattle valued at \$205,816,000.

These figures explain themselves, and prove the vastness and the extent to which dairying is carried on throughout Canada.

Canada is the second largest cheese-producing country in the world, the quality of her cheese is excellent and is much appreciated on the Home market.

In 1925 the total value of dairy produce manufactured in Canada was estimated at 241,069,320 dollars.

In 1910 the dairy cattle in the Commonwealth of Australia numbered 2,064,599. No progress was made during the next ten years, as the figures given in 1920 show a falling off of 9,000; however, by 1925 the total number of milking cattle had increased to 2,444,637.

The exports of butter and cheese from Australia to Great Britain during 1927-28 are expected to exceed 40,000 tons.

The extent to which dairying has developed throughout New Zealand reads almost like a fairy story. The centrifugal system of cream separation came into general use about 1886, and the first commercial export of butter and cheese, under refrigeration, took place in 1888-89, when 29,995 cwts. of butter and 36,683 cwts. of cheese were exported. Since then production has increased until, in 1927, exports of butter totalled 1,455,573 cwts., valued at £10,915,390, and exports of cheese totalled 1,492,792 cwts., valued at £5,582,596.

Herd testing is carried on generally throughout the Dominion, and the production, per cow, over the last ten years, shows a wonderful increase. The outstanding features in New Zealand dairy produce are the high level of quality and the uniformity of manufacture throughout the entire Dominion.

The writer's references to South Africa are to the effect that although this Dominion is one of the oldest settled points of the Empire, dairying has not made the progress noticeable in the other Dominions. Production in 1910-11 totalled 5,050 tons; this had increased in 1925 to 9,070 tons.

In conclusion, Major King considers that the only way that dairy farmers in the Empire can look towards reducing the present high cost of manufacture is by increasing the average yield per cow, by herd testing, breeding a better class of stock, and increasing the carrying capacity of their farms by top dressing with artificial manures.



## Sand Veld Farming and its Possibilities.

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By E. D. ALVORD, M.Sc.(Agr.), Agriculturist for  
Instruction of Natives.

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It is often said that the sand veld soils are not suitable for maize growing and general farming. It is admitted that virgin sand veld soils rapidly lose their fertility when cropped under the usual methods practised by most Rhodesian farmers. Under such conditions this loss of fertility is only to be expected. Farming is similar to banking. A man cannot long continue to draw on his bank account unless he maintains a credit balance there by means of frequent deposits.

Even the poorest sand veld soil, depleted of most of its fertility, can be brought to a high state of productivity within a short time by adopting simple and practical farming methods. This statement has been proved conclusively during the past few years by the Government School for Natives at Domboshawa on Chindamora Reserve, where unproductive sand veld soils, which had been cropped for years under kaffir farming methods, have been made to produce 18 and 20 bags of maize per acre. In addition to this, excellent yields of beans, ground nuts, potatoes, sweet potatoes and other crops have been reaped from these same soils.

For the benefit of certain readers it may be well to say something of the school itself. Domboshawa is located about 19 miles north-east of Salisbury on the south-west corner of Chindamora Reserve. The whole school farm was originally part of the Reserve and most of the school lands had been well cropped by natives prior to the farm being taken over for native education purposes.

The soil on both the school farm and the Reserve is all granite, generally very poor sand veld, and the yields at



Plate No. 1 -Demonstration Plots, Chindamora Reserve. In the foreground maize on the kraal owner's land yielding less than one bag per acre. In the left background maize in a four-course rotation yielding  $10\frac{1}{2}$  bags per acre. Note the exceptional growth of Sunn hemp.



Plate No 2 -Crop Rotation, Domboshawa School.—Showing maize with manure, and ground nuts. Note the uniformity of the stands and excellent growth.







Plate No. 3—Velvet beans grown for green manure on sand veld at Domboshawa School.



Plate No. 4—Crop Rotation Demonstration, Domboshawa School. Results of using velvet beans in a crop rotation. Photograph taken 1st March, 1928, after a prolonged dry spell.





first were very low. Teaching the native students how to improve these worn-out soils has been one of the major operations at the school.

In facing the problem which confronted him, the Farming Instructor recognised two facts:—First, that sand veld soils in particular are very deficient in nitrates; second, that worn-out sand veld soils contain little or no humus. He knew that the two things necessary for good plant growth, namely, decayed organic matter and the needed plant food elements, must be supplied before these worn-out sand soils could be made productive. In addition to this, however, he faced another problem which made his work still more difficult. He was confronted by the fact that his job was to instruct natives in good farming, and natives are naturally very superstitious. The progressive European farmer might turn to commercial fertilisers, but these are regarded by the superstitious native as “muti,” and their use is considered a form of witchcraft. Even apart from this, commercial fertilisers are of little value if the soil is devoid of humus; but as conditions were, organic matter had to be supplied and nitrates had to be added in sufficient quantities without resorting to commercial fertilisers.

The Farming Instructor (Mr. S. Haworth) did the only sensible and practical thing, a thing which any Rhodesian farmer can do if he so wishes. He took the teachings of the Department of Agriculture, which many farmers think cannot profitably be put into practice, and by applying them in a practical manner, changed this worn-out sand veld soil into a highly productive loam. To get the nitrates into the soil he planted legumes. He put humus into the soil by green-manuring and the application of kraal manure. He did not do these things by using the slipshod methods followed by so many farmers who cannot screw up their courage to do it in the right way. He put into practice definite systems of crop rotation, as recommended by the Department of Agriculture, which included the planting of legumes, green-manuring and the application of kraal manure.

What has been done at Domboshawa any Rhodesian farmer can do on sand veld soils. Many farmers feel that they cannot go in for commercial fertilisers. There is no need for them to do so, for, through the judicious use of kraal



manure, green-manuring and the planting of legumes in a well-balanced crop rotation, commercial fertilisers are unnecessary. This has been clearly shown by the soil improvement work carried on at Domboshawa School and on Chindamora Reserve. The following illustrations will give a good idea of the success of this work.

Plate No. 1 illustrates a quick method of soil improvement developed by the Farming Instructor. By its use the poorest sand veld has been put into a high state of productivity in two years. His method is to apply kraal manure the first year and plant maize. The year following this land is planted to a legume crop for green manure. Sunn hemp and velvet beans have both been found very suitable, but Sunn hemp is the better when planted after the manure. After ploughing under the green-manure crop, it was found that the soil was highly productive. The demonstration illustrated above was made in a native land on Chindamora Reserve and not at the school. In the foreground is shown the maize grown by the kraal owner, which yielded less than one bag per acre. In the left background is shown the maize grown with kraal manure, yielding  $10\frac{1}{2}$  bags per acre. On the right is shown Sunn hemp which was planted on soil which had maize with manure the previous year. The dense, even stand, six to seven feet high, over the entire plot, was the result of manuring. Such growth of Sunn hemp cannot be expected on unmanured soil. It should be noted that this system of following kraal manure directly with green-manure crop is not recommended for general use in a definite crop rotation. It is only suggested for use the first two years in bringing exceptionally poor sand veld soils to good productivity quickly. At the end of the two-year period we recommend that a more usual crop rotation scheme should be adopted.

Plate No. 2 shows maize and ground nuts in a rotation system commenced on 16 acres in 1925-6 on old kaffir lands at Domboshawa School. The crops shown in the picture were grown in 1927-8. This photograph was taken on a windy day, but the uniformity of stand and the excellent growth of both the maize and the ground nuts are well shown. When one considers that these crops were grown on very poor sand veld with a rainfall below normal, one is still more impressed with the good returns in sight.



Plate No. 5—Demonstration Plots, Chindamora Reserve.—The old and the new methods. Compare the crop in the foreground with that in the background, which yielded  $17\frac{1}{4}$  bags per acre.



Plate No. 6—Demonstration Plot and Native Garden, Chindamora Reserve.—Yield of maize crop on left,  $17\frac{1}{4}$  bags per acre; on right, 4 bags per acre.









Plate No. 7—Maize on sand veld, Domboshawa School.



Plate No. 8--Potatoes grown on sand veld at Domboshawa School.  
Yield, 65 bags per acre.





Plate No. 3 shows velvet beans in a four-course rotation on 16 acres commenced in 1925-6. The velvet beans formed a solid mat of luxuriant vegetation two or three feet deep over the entire four acres, and the picture demonstrates well the value of this legume when grown on light sandy land as a soil renovator.

Plate No. 4 indicates the results of using velvet beans in a crop rotation. It shows maize planted on sand veld following velvet beans, which were ploughed under as a green manure crop. These pictures were taken on the 1st of March, 1928, after the crops had undergone a prolonged dry spell extending from the third week of January. It is quite evident that as a result of good farming practice the crops were only slightly affected by the drought.

Plate No. 5 shows a demonstration plot worked for Gamanya, a native on Chindamora Reserve, with the kraal owner's maize in the foreground. Manure was applied to this plot in 1926-7 and maize was planted. The yield was  $17\frac{1}{2}$  bags per acre. The kraal owner's land adjacent yielded  $4\frac{1}{2}$  bags per acre. This shows well the value of kraal manure in renovating worn-out sandy soils.

Plate No. 6 shows the growth on the demonstration plot worked for Sjambok on Chindamora in 1926-7—yield  $17\frac{1}{2}$  bags per acre. The kraal owner's maize shown on the right yielded 4 bags an acre. Domboshawa Hill is in the distance. In all there were seven demonstration plots conducted on Domboshawa Reserve on old kaffir lands, and they were all equally good.

In 1926-7 the average yield of maize from demonstration plots in the Reserve was 15.35 bags per acre. This yield was obtained by the use of kraal manure and better farming methods. The average yield on adjacent native lands was 3.65 bags per acre. These results indicate clearly the value of manuring and good farming practice, particularly so as the rainfall that year, 22.48 inches, was below normal and badly distributed.

Thus far we have found the best rotation on sand veld soils for the purpose of building up the soil and maintaining its fertility is a four-year one, including kraal manuring and the planting of a legume for ploughing under once in four years on every land. The choice of crops in this rotation



is optional, with the exception that maize should be planted when kraal manure is applied and the legume can most economically be planted two years later. Thus, the manure and the legume alternate two years apart. When kraal manure is not available a leguminous green-manure crop should be planted on every land once in each three or four-year period. Thus, a three-year or four-year crop rotation would be followed.

The results of the work at Domboshawa School and on the Reserve prove conclusively that farming on sand veld can be carried on successfully, only by adopting a definite system of crop rotation, including legumes, combined with a definite plan of manuring. The farm land should be divided into suitable sized rotation units. Each of these fields should be assigned a number by which it can be known and the crops which make up the rotation should follow each other in a definite regular order on these lands. It would be wise for the farmer to keep a plan showing the number, position and area of each field, and on this plan should be written up each year full particulars of cropping, manuring, return per acre and so forth.

The soil of his farm is the farmer's capital asset. Unless he crops it in such a way as to maintain and improve its fertility he is heading for certain failure. The Department of Agriculture can recommend several practical crop rotations suitable for sand veld farming. My advice to every sand veld farmer is to screw up his courage, take the plunge, and, without loss of time, get started on a well considered and definite crop rotation scheme which will meet his requirements. In this policy lies the only hope for sand veld farming.



Cattle parade at Bulawayo Show, 1928.



Schuttendraai Marlands Songster, owned by Messrs. Roberts & Letts, runner-up for 1,000 guinea trophy at Bulawayo Show, 1926 and 1928. Has proved a good stock getter, and many of his progeny have taken prizes at leading Rhodesian shows.

## Precautionary Measures against Tobacco Diseases.

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By J. C. F. HOPKINS, B.Sc. (Lond.), A.I.C.T.A. (Trinidad),  
Government Mycologist.

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In last month's issue of this Journal attention was called to the necessity for treating tobacco seed with some anti-septic in order to destroy germs of bacterial diseases, such as angular spot and wildfire, which are carried on the seed coat. Full details were not given, as these have already been published in previous articles on the care of seed beds (1). These articles are available in bulletin form and may be obtained from the Editor upon application.

During the past year further information has been obtained in this country and from abroad relative to the methods by which diseases are carried from crop to crop. There is no doubt whatever in the writer's mind that bacterial leaf diseases, *i.e.*, angular spot and wildfire, in this country are most certainly brought into seed beds on the seed. This may not be the sole source of infection, but, by tracing the distribution of certain lots of seed, it has been shown conclusively that these diseases have been carried from farm to farm by this means. It is evident, therefore, that much care should be taken to ensure thorough disinfection of seed as the first step in protecting the tobacco crop from damage.

The second and common source of contamination lies in old tobacco refuse. Too much attention cannot be paid to cleaning up old lands, destroying by burning old plants and suckers and the thorough cleansing of grading sheds and other buildings which have housed last year's crop. All such sheds should have a good spring cleaning and be sprayed out with formalin before cheese cloth, tools, etc., are taken to the seed bed sites. The use of formalin (1 part to 25 parts water) for disinfecting buildings has been shown to be



very satisfactory and entails little extra expense. Whilst this operation is being carried out, it is advisable to treat cheese cloth also with formalin. The material should be laid out and well sprinkled with the solution, and then piled in a heap to be left overnight. It should be thoroughly aired the next day, carefully folded up and stored in a place which has not previously housed tobacco. The latter point is obviously of extreme importance, but is frequently overlooked by farmers. As an alternative to formalin treatment, cheese cloth may be boiled for half-an-hour in water. This method is not, however, as easily accomplished as the former, involving as it does the necessity for large tanks.

The seed, sheds, tools and cheese cloth having been disinfected and stored in a disease-free shed, it is now necessary to turn attention to the seed bed site. It is not proposed to go into full details of their preparation, since this can be obtained from previous articles written for this Journal by the Tobacco Expert (2) and the writer (1), but a few words of warning will not be out of place at this time of year.

*Firstly*, see that your land is well drained. It is much easier to add water than to remove it. *Secondly*, keep all old tobacco refuse as far from your seed bed site as you can. Do not use old plants and suckers for burning on the beds; they burn badly, leave too great an excess of potash in the ash and harbour disease in the minute fragments of dust which inevitably blow about and are not burnt. *Thirdly*, do not neglect the important operation of burning. If carried out properly, the fertility of the soil is increased and not diminished. Remember that in nearly all soils there live certain fungi which are the cause of damping-off of seedlings. These are destroyed by burning. Eelworm may be the cause of almost complete loss of a crop if introduced to the lands, and is difficult to eradicate when once established. Burning your seed beds kills the eelworms. *Fourthly*, do not use old vegetable gardens for seed beds. Such soil almost invariably harbours disease organisms, particularly eelworm. Remember, if you do not burn the soil between and surrounding the beds, your sterilised soil will almost certainly become re-infected from this source.

Your beds are now ready for sowing. Do not let the boys chew tobacco whilst working. Germs of numerous diseases

can easily be transmitted to seedlings if old tobacco, particularly air-cured scrap, is allowed in the vicinity. Recent experiments carried out in America on the occurrence of mosaic in tobacco showed that chewing-tobacco was a serious source of contamination. An extract from the report on these experiments is very illuminating (3).

“ Of 134 plants pulled (*from seed beds*) by a man who chewed viruliferous natural-leaf tobacco and occasionally spit on his hands while pulling, mosaic developed on 108; while 156 plants pulled with clean hands were healthy 47 days after setting. When no effort was made to contaminate the worker's fingers, 878 plants developed 39 cases of mosaic. When 837 plants were pulled with clean hands and set in alternate rows, but one case of mosaic developed in 48 days.”

Other experiments have shown that commercial tobaccos (pipe and cigarette) are also infected with mosaic virus, which has been found to be active after five years' drying. Commercial tobacco re-dried at 165° F. for 40 minutes was still found capable of producing 100 per cent. infection. These facts emphasise the need for constant supervision of labourers by Europeans.

Once the leaves of the young plants have attained the size of a shilling, they should be regularly sprayed with Bordeaux mixture of the strength 4-4-50, that is, 4 lbs. copper sulphate (bluestone), 4 lbs. lime, to 50 gallons water. This should be sufficient for about 250 square yards of bed. Do not use too dilute Bordeaux and do not try to spray 1,000 square yards with the amount required for 500 square yards. If you do, do not blame the Bordeaux when diseases appear. Buy Bordeaux mixture in which the bluestone and lime are made up in separate packets and mix them yourself prior to spraying. Follow carefully instructions given by the manufacturers. Only make up enough for one day's use. The fungicide is useless if kept overnight. Use a proper spray pump and not a watering can. A fine, mistlike spray is one of the secrets of success with Bordeaux mixture, since the plants become uniformly covered with the chemical. Put the Bordeaux mixture in a wooden receptacle. Petrol tins weaken the action of the spray, because a good deal of the copper (which is the poison) is deposited on the tins.

Do not spray by schedule. Spray approximately once a week, but judgment must be used in order to keep the leaf surface always covered with a thin blue film. Remember that disease organisms are of minute size and can only be seen clearly by a microscope. Angular spot bacterium is only about one ten-thousandth of an inch long, so that unless a leaf is very uniformly covered with Bordeaux mixture, the germ has ample opportunity of penetrating this line of defence. Continue spraying right up to the time of planting out, and make sure that your boys have not been handling tobacco before they commence work.

Lastly, remember that prevention is better than cure. Clean beds make clean crops.

#### SUMMARY.

1. Treat your seed and cheese cloth.
2. Burn your beds.
3. Spray regularly.
4. Clean up all tobacco refuse on the farm.

#### REFERENCES.

1. Hopkins, J. C. F.—“The Care of Tobacco Seed Beds”; *Rhodesia Agricultural Journal*, July, August and September, 1927; reprinted as Bulletin No. 653.
2. Brown, D. D.—“Tobacco Seed Beds”; *Rhodesia Agricultural Journal*, September, 1926; reprinted as Bulletin No. 607.
3. Valleau, W. D., and Johnson, E. M.—“Experiments and Observations on the Control of true Tobacco Mosaic.” *Phytopathology*, xviii., p. 132. 1928. (Abstract.)



## Monthly Reminders for the Farming Year.

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BY THE DIVISION OF THE CHIEF AGRICULTURIST.

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*[These notes should be read in conjunction with the Calendar of Farm Crop Sowings which appeared in the last issue of the Rhodesia Agricultural Journal. Bulletin reprints will be made of the present article and copies can be obtained upon application to the Department of Agriculture.—Ed., R.A.J.]*

### JANUARY.

If not already sown, put in the ensilage and fodder crops at once, such as maize and legumes, oats and other hay grass crops.

Sow short season crops like haricot beans, linseed, buckwheat, peas, summer oats, gram and mung bean.

Plant out grasses and kudzu vine for pasture.

Ridge potatoes and cultivate thoroughly. Main crop can still be planted.

Quick growing green manuring crops, such as cowpeas, soya beans and sunn hemp, may still be sown this month.

Earth up ground-nuts so that a small amount of loose soil is thrown over the crowns of the plants. This assists the formation of nuts.

If not already done and where practised, legumes or long season oats such as Algerian can be sown under the maize crop for grazing and to add nitrogen and humus to the soil.

Cultivate all growing crops well, and thoroughly eradicate weeds.

Overhaul all hay-making implements and ploughs and get in thorough repair in preparation for the haying and ploughing seasons.

Endeavour to mow grass fields early for hay and litter, and to obtain second cutting for hay in April.

Fallowed lands or fields not yet planted may be disc-harrowed or ploughed to prevent weeds from seeding.

Mow grass paddocks infested with annual weeds to prevent the weeds seeding.

Prevent mexican marigold and other noxious weeds seeding by hoeing or pulling out the plants by hand.

Keep a sharp look-out for maize stalk borer. Cut off the tops of infested plants or treat them with a recognised chemical preparation. If topping is practised, remove tops from land, and bury, burn or feed them at once to farm stock.

Watch the maize lands for witch weed. Prevent witch weed plants from seeding by cultivation and by hand-pulling the plants.

Make as much manure as possible by placing grass and litter in cattle kraals, pig sties and stables.

If there is stumping and clearing to be done, push on with it. Endeavour to get as much of the new virgin land as possible broken up during this and the two following months.

## FEBRUARY.

Cultivate, and keep on cultivating as weather permits, to destroy weeds.

Continue to look out for stalk borer, and if infection is discovered, deal with infested plants as advised in January notes.

Watch witch weed and continue cultivating and hand-pulling it. Plough under witch weed, smother and trap crops.

Where practised, maize can be under-planted with sweet potato vines after the last cultivation for the following season's requirements.

Potatoes and ground-nuts will probably need to be ridged again.

Catch crops of quick maturing beans, such as tepary bean, also buckwheat, can still be sown.

Keep down all noxious weeds. This work can be undertaken on wet days.

Make veld grass hay whenever a few days of fine weather permit. Early mowings provide the best hay.

Seed beds of onions for early winter planting can be sown towards the end of the month.

Keep potatoes in a cool shed, well ventilated.

Pick over any potatoes in storage and remove bad ones.

Continue to make as much farm manure as possible.

Begin to ride manure and place in heaps handy to the lands to be manured.

### MARCH.

Watch oats for rust, and, if badly infested, cut crop for hay as soon as weather permits.

Ridge late potatoes, and if weather is dry prevent ridges from cracking, to check tuber moth infestation.

Finish ploughing under all green manure crops while the ground is still moist enough to promote rapid decomposition.

Late in the month begin to cut silage crops and ensile. Cut out barren maize plants and feed to stock or ensile.

Cut sudan grass for hay to permit of final late growth for autumn grazing.

Reap any crops that are ready, and plough the stubbles *at once*.

Lift ground-nuts that are sufficiently matured. Watch for ground-nuts making second growth; reap, and when sufficiently dry place in cocks with nuts inwards, and cover the top securely.

Sow onion seed beds for winter crop.

Watch the weather for hay-making and take advantage of fine spells.

Towards the end of the month hay-making should normally be in full swing.

Continue to plough all lands in succession immediately the crops are reaped from them.



Vleis and irrigable lands should now be ready, or in process of being prepared, for winter crops. Early sowings of Algerian oats, barley or rye for green forage can be made.

Allow any potatoes lifted to dry before storing them, but do not leave too long in the sun.

Destroy witch weed and other noxious weeds.

Continue to make all the kraal manure possible by throwing grass and litter into kraals, yards, etc.

Begin to select in the field maize plants for seed purposes, and mark them with slips of coloured cloth.

Press on with the breaking up of any virgin land which may have been stumped or cleared earlier in the year.

Place orders for grain bags without delay.

Early in the month silage pits should be cleaned out, or, where necessary, new pits dug.

#### APRIL.

If sufficiently mature, begin cutting and stooking early maize over a small acreage and plough up the ground whilst still damp between the rows of stooks.

If ripe, reap and husk early planted maize, and keep it in a separate dump.

Continue to make field selections of the best maize plants, and mark those required for seed with strips of coloured cloth.

Lift any ground-nuts and potatoes showing signs of making second growth.

Make silage; cut maize for this when the ears are in the "dough" stage.

Pick up and stook maize plants blown over to protect the ears from white ants.

Feed sweet potato vines to stock, reserving any new growth of vines for feeding as grazing in May.

Plough in any green manure crops not already turned under.

Plough fallowed land.

Keep potatoes reserved for seed on racks in a cool place protected from frost, but well ventilated.

Transplant onions from seed-beds to irrigated or naturally moist lands; irrigate about once a week, but do not apply too much water.

Pick over potatoes which may be lifted, and remove the bad and diseased ones.

Winter cereal crops for grain can be sown towards the end of the month.

Cart manure to the lands.

Remember that good and deep ploughing to a depth of at least 7 to 8 inches is essential, and the basis of all successful arable farming. If the lands are not already ploughed so deep, increase the depth of ploughing about an inch a year until this depth, or even more, is reached.

On lands which have been ploughed for a number of years at the same depth, use a grubber to stir up the sub-soil without lifting it to the surface.

Too much attention cannot be paid to good tillage. It is usually good practice to follow the plough at once with a harrow or other suitable implement to break down the clods before they bake hard.

Continue breaking up new lands; the earlier this is done the more complete is the decomposition of the vegetable matter in the soil.

When making hay of coarse legumes such as velvet and dolichos beans and cowpeas, be sure that the vines are dry before stacking. Handle the hay as little as possible to avoid loss of leaf.

Thought should be given to laying in supplies of thatching grass for thatching and repairing roofs.

The veld may be beginning to dry off. Consideration may be given to mowing or otherwise preparing fire lines as a preventative against veld fires.

## MAY.

Continue to cut and stook maize as it matures; make the stooks small to assist drying. Later in the season the stooks may be made larger.

See that the stooks are secure and pick up plants lying on the ground.

Continue to plough up land between stooks of maize.

Give all maize harvested, whether husked or in the husk, a chance to dry out before riding to the dumps.

Do not begin shelling if the ears are still damp.

Do not use new grain bags too much for harvesting maize.

Make the dumps of unhusked ears as small as possible; the smaller the dump the quicker the grain will dry out. Grain on the cobs dries extremely slowly, if at all, in dumps of large size.

Do not mix unhusked ears from the stooks with dryer ears harvested later from the standing crop.

Keep the dryer ears in a separate dump; shell, bag and stack such maize separately.

When cutting maize for stooking, insist on the stalks being cut within 2 to 4 inches of ground level. The plough, in Rhodesia, will bury roots with stalks 8 to 12 inches high. A long stubble of stalks makes clearing of the ground for ploughing very tedious and expensive.

If not already harvested, ground-nuts should be lifted before the first frosts damage the hay.

Finish transplanting onions from seed-beds. If plants are not flourishing after transplanting, give a light dressing of nitrate of soda—50 lbs. per acre. Repeat in a fortnight if needed.

Sow most winter cereals on wet vleis or under irrigation early this month.

Feed your sweet potato vines to stock; if frosts occur the vines will be killed. Dig and feed tubers from end of month onwards.

Towards end of month harvest cattle pumpkins and melons and handle carefully; avoid bruising to prevent rotting.

Place pumpkins and melons in a dry situation in the open and in a single layer.

Supply plenty of roughage to cattle pens, kraals and stables to increase the manure supply.

Collect and cart manure to lands for spreading.



Do not attempt to plough in dry grass or quantities of maize refuse. The plough will not turn it under and it will not rot before next planting season. Burn such refuse and make a good job of the ploughing.

If the weather seems set fair, commence brickmaking. A small kiln of bricks always on hand is most useful.

As labour permits, re-thatch buildings and outhouses in need of repair.

Overhaul, grease and paint planters, drills and other implements not required again until next season, and store away under cover.

Think about your fertiliser requirements for next season and place your orders.

From now onwards the second ploughing of new land broken up earlier in the season should be pushed on with as opportunity offers.

### JUNE.

Select seed from the very best of your own crops. It is always wise to keep more seed than you may need for planting.

Do not shell and ride your maize to the railway unless it is fit for export or market.

If in doubt regarding the moisture content of the maize, send a 2 lb. sample in an air tight tin, such as a golden syrup tin, to the Agricultural Department and have it tested.

Provide ample dunnage for your maize stacked at the railway or on the farm. Use maize cobs; husks are almost useless for this purpose.

Sew your bags of maize according to the export regulations and stack them properly at the railway side, leaving plenty of room between the double rows.

Select pumpkin and melon seed from the best specimens.

Support your agricultural show and make it a success by preparing and entering as many exhibits as you can. No one is more to blame for a poor show than the farmers themselves.

Make a list of the seed requirements for next season, and where purchases must be made place the orders early.

Veld fires must be anticipated, and if not already attended to, the mowing or burning of fire-guards, both boundary and internal, should be proceeded with.

### JULY.

Support agricultural shows, and add to your list of exhibits.

Advertise your goods through the shows. Interested people will see them.

If you require to make purchases of seed for next season, judge by the exhibits on the show what grower can best supply your needs, and place your orders accordingly.

Attend the shows and go there to learn all you can about your business, not merely to have a good time.

Seed maize previously selected in the field should be butted and tipped and hand shelled. Keep the butt and tip grain for check-row planting by hand.

Do not over-irrigate winter crops, and do not irrigate when the wind is from the south, as this often means frost at this time of year.

Troublesome weeds, such as darnel grass or drabok, may be removed from cereal crops by hand.

Ploughing should be pressed on with, and maize stalks and roots of maize and other trash from the crop should be collected and burned very thoroughly. A land littered with unburnt and unrotted stalks and roots cannot be brought to a suitable tilth for planting and subsequent cultivation.

Silage and sweet potatoes and other succulent feeds will have come into general use now, the potatoes being lifted from the land as required.

The application of phosphatic fertilisers which are to be ploughed or harrowed in can be begun.

Take the opportunity, during this and the next month or two, of inspecting all boundary and paddock fencing and gates, and effect repairs where required.

Give a coat of paint to implements, wagons and carts. This protects the woodwork from rotting and the iron from rust.

## AUGUST.

If not already marketed, the main potato crop will probably be sold about now. Do not forget to grade the potatoes properly according to size. The buyer wants potatoes—table or seed—of even size, not large and small indiscriminately mixed.

Select and clean farm-grown seeds ready for next season's planting. Label the bags with name and weight of contents.

Build a proper shed for your seed potatoes on the lines recommended in the *Rhodesia Agricultural Journal*.

Sort over seed potatoes in store and remove any diseased or rotten.

Green oat or barley fodder on wet vleis, or under irrigation, will become ready for cutting.

Press on with ploughing and cross-ploughing.

Decide what crops are to be grown next season, and, if you think fit, discuss the matter with officers of the Department of Agriculture.

If you have not already effected all your purchases, consider the question of what seed you will require to buy for next season, and discuss the matter with other farmers. If in doubt, consult the Department of Agriculture.

In frost-free situations, potatoes can be planted for an early crop under irrigation or on damp land.

Cart and spread your farmyard manure and plough it under as soon as spread to avoid loss. If you have any long stable manure, apply it to your heaviest land.

The application of phosphatic fertilisers to the land can continue.

If you do not already have one, put up an implement shed, even if it be only poles and grass. Keep wagons and scotch carts under a similar shed or in the shade of trees.

Speed up the making and burning of bricks if this is still in progress.

## SEPTEMBER.

Utilise your labour to the fullest extent for stumping and clearing more land for mixed crops and for general farm development. Do not be satisfied unless each year sees more



profit-earning development work effected. Good organisation of the farm work will permit of much being done without great cost.

Begin marking out holes for hand check-row planting of maize, and apply manure or fertiliser.

Fertilisers which are to be broadcasted and ploughed or harrowed in can be applied.

Do not forget that lands which have been green manured in March or April will require a second ploughing about this date or before being seeded to crops.

Early varieties of winter cereals ripen this month and require harvesting.

Danger from frost should be past now, and crops susceptible to frost, such as potatoes, onions in beds for the summer crop and Jerusalem artichokes, may be planted where lands are moist.

Pumpkins and early maize may be planted on vlei lands.

Edible canna may be planted "dry" during the latter half of this month, where some rains may be expected during next month.

Overhaul all implements and replace worn parts. Putting this off till the planting season may mean serious loss of planting opportunities between rains.

Get out the planters and seed drills. Overhaul and place in proper working order.

Ploughing and cross-ploughing should be hurried on with; also the ploughing under of farmyard manure. A spiked roller can usefully be employed for breaking down clods, particularly on those lands which are to be planted first.

Make every effort to secure as good a seed-bed as possible; good seed-beds mean good stands, and good stands are all-important in securing good yields.

## OCTOBER.

If not already attended to, overhaul all farming implements and replace worn parts to ensure efficiency.

Shell ground-nuts required for the season planting.

Ploughing of old lands should, at latest, be finished this month.

If seed potatoes will not keep in good condition until next month, they may be planted now, but later planting is better.

Edible canna may be planted this month before rain falls. Also velvet beans, dolichos beans and sunn hemp towards the end of the month for green manuring.

Harvest winter cereals and plough under the stubbles as soon as possible after harvest.

When rains have fallen, use every effort to improve the tilth of the lands which will be the first to be planted.

On cloddy lands already ploughed, seize the opportunity to break down the clods by disc and drag harrowing as showers of rain fall. A spiked roller is very useful for this work.

A good tilth means good planting, and a good stand of maize, therefore do everything possible by cross-ploughing, disc and drag harrowing to bring the soil into good condition for seeding.

When necessary, keep the harrows going to check early weed growth. Clean lands at this time of year are an insurance against cutworm and other insect pests.

If weather conditions permit, plant a trap crop of maize to attract the stalk-borer.

New land to be ploughed and intended for planting this season should be cleared of heavy grass or weeds by burning or cutting to ensure good work being done by the ploughs.

Seasonal showers of rain are liable to spoil bricks unburned. See that bricks which have been made are protected from rain.

Clean out guttering and down-spouts of house and farm buildings.

Press on with development work so as to have this completed before rains break.

## NOVEMBER.

Take note when the first rains fall and see what leaks there are, if any, in the farm buildings. Don't neglect to effect such repairs as are necessary.

Early in the month see that the planters are in perfect order and that they drop the different seeds to be planted, evenly and at the right distance. Try them out on the farm road.

Hasten the work of getting the lands for early sown crops into as good a condition for seeding as possible, so that the first and most favourable opportunity for planting may be seized. The young plants make more rapid growth in a good seed-bed. Utilise exceptionally early rains for this purpose rather than for planting.

The holes for check-row planting of maize can continue to be prepared until sufficient rain has fallen to allow of planting.

Velvet beans and dolichos beans, for seed or hay, may be planted "dry" if the land is in good order.

With favourable weather, planting of maize, velvet and dolichos beans and cotton, will commence about the middle of the month and will continue as the condition of the land and the rainfall permit.

Main crop potatoes should be planted from now on to January.

Dhal may be planted for seed or green manuring—if for seed, a frost-free situation is necessary.

Kaffir corn for seed may be planted this month.

Green manure crops requiring a long growing season should be planted.

Destroy, by feeding or burning, early planted trap crop of maize or volunteer plants which have become infested with stalk-borer.

If weeds are beginning to show, keep the harrows going in front of the planters. If weeds are too advanced to be killed by drag harrows and too numerous to be dealt with by hand labour, use the disc harrow or lightly replough the land.



If the tilth is good, don't be afraid to harrow the young maize. This will save much labour later on by destroying the weeds while they are small.

### DECEMBER.

Keep the cultivators going, both on planted and unplanted lands, whenever weather conditions are favourable. Destroy the weeds while young and before they obtain a firm root-hold.

Continue planting maize, cotton, beans and ground-nuts as early as possible this month, followed by sunflowers, Sudan grass, manna, pumpkins and cattle melons.

Linseed, cowpeas, teff grass, oats, sunn hemp, should be planted after the other crops are in.

Ensilage crops may be sown at the end of the month.

When harrowing maize after planting, this work should be done in the heat of the day when the young plants are flaccid and not easily broken.

On lands not yet planted the crop of weeds should be kept down by disc-harrowing.

It is a good plan to harrow or disc-harrow immediately before the planter, or alternatively to follow the planter with a light harrow.

Treat seed oats for smut before sowing. Use one pint of formalin to 25 gallons of water and steep the bag of seed for ten minutes.

Earth up early planted potatoes.

Keep a look out for the stalk-borer and top or otherwise treat affected plants.

New lands and old pastures may be broken, as circumstances permit, during December, January and early February, and again ploughed in from May to July. If they carry a heavy crop of grass it should be cut or burnt to enable good clean ploughing to be done.

Sweet potato slips should be planted early in this month. Do not fail to have in a few acres of this valuable crop.

## Some of the Uses to which a "Cylindrical Metal Maize Sheller" can be put.

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By H. S. ADAMS, Brockenhurst, Gwelo.

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*[This most interesting article was kindly written for the Rhodesia Agricultural Journal at the special request of the Chief Agriculturist.--Ed., R.A.J.]*

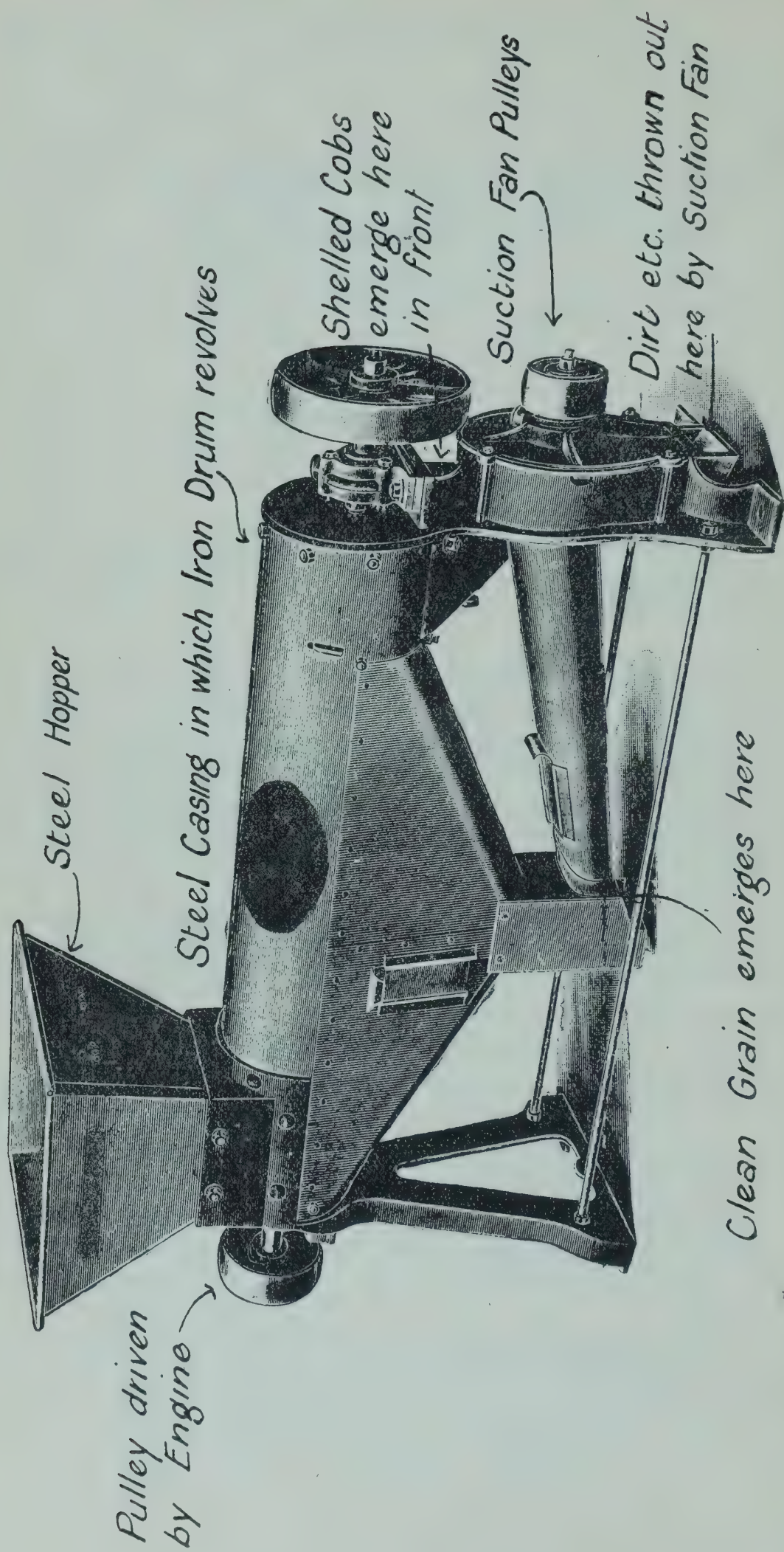
As far as one has been able to see in visiting farms, the smaller farmer in Rhodesia toils wearily with his mealie shelling by using the very common wooden-framed, manually operated 2-hole sheller, which it is alleged will turn out 60 bags per day, but which in actual practice will rarely average more than 40 bags per day through the shelling season.

The writer used one of these for the first three seasons of his settlement in Rhodesia, and being entirely dissatisfied with the sheller owing to its general inefficiency, the long monotonous grind (never turning out more than 38 bags average) which locked up a great deal of labour for a considerable period, and the comparatively costly handling of the crop for this reason, cast about for some other type of sheller which would remove these disabilities at a reasonably low capital cost.

It was evident that any manually operated machine that was known or advertised by dealers could not fill the bill, and that something to be driven by an engine was required.

After careful enquiry, the metal cylindrical sheller which required a 5 h.p. engine to drive it seemed to be the best proposition to suit the circumstances, and a machine of this type was therefore acquired at a cost of £31, together







with a 6 h.p. paraffin engine at £75, or roughly £100 for the complete outfit.

The appearance of the sheller will be seen from the accompanying illustration.

The essential features are a cylindrical iron core to which numerous short iron teeth or studs are fitted. This core revolves inside the steel case at 600 revolutions per minute, beating the maize from the cob, and drawing the stripped cobs to one end and throwing them out.

An absolutely clean job is made of the shelling, not a single grain being broken and no grain is left on the cob.

The belt driven from the revolving cylinder is a powerful suction fan which draws out dirt, etc., and ensures nice clean grain being delivered for bagging, the grain pouring out of the centrally-fitted chute below the machine.

In order to use the sheller correctly a platform 2 feet 6 inches high was erected, to which the machine was bolted as shown in the sketch. A large wooden hopper with a slope of about 15 degrees was fitted to lap over the top of the steel hopper of the sheller, the wooden hopper being large enough to contain the contents of two sacks of cobs. From this the cobs, which had been husked in the field in the ordinary way, were fed direct to the sheller *via* the steel hopper. The manufacturers claim that the machine will shell from 28 to 30 bags of maize per hour, according to the nature of the crop, and this claim was found to be well substantiated.

After a few preliminary canters, 400 bags of cobs were put on the floor to be used as a first good test.

The machinery commenced running at 7 a.m.; at 4.30 p.m., with one or two minor "jams" and with one-and-a-quarter hours off for meal hours, the floor was swept clean, 200 bags of grain being sewn up and the majority of the boys being away again reaping.

On the second test, with 400 bags on the floor, commencing at 7.30 a.m., the floor was cleaned up by 3 p.m. and the reapers were again on their job.

In the first test 26 bags of grain, and in the second 34 bags of grain, were turned out per hour.

It was apparent at the first test that the available labour, *i.e.*, nine boys, could not handle the cobs fast enough for the machine, and on the second test eleven boys were employed and were found to be sufficient.

These were disposed as follows:—

One boy on platform feeding into sheller.

One boy on platform emptying half bags of cobs into wooden hopper.

One boy on ground at platform passing up half sacks of cobs.

Two boys carrying and filling bags as requisite (5 yards from floor to machine).

Four boys half filling bags with cobs.

Two boys filling bags with grain from large packing case (see sketch) on ground under machine, lugging filled bags away and arranging in convenient rows for sewing and keeping stripped cobs clear of machine.

The total labour cost per day for shelling was roughly (without rations) 6s., or .03d. per bag of grain. The cost of paraffin, etc., was approximately one farthing per bag. To this, of course, should be added supervision, interest on capital and depreciation and other similar items.

It will be seen that the cost must compare very favourably with that of shelling by a man-handled sheller which probably required six to eight boys to do 40 bags per day, while the quick release of the labour for reaping or other work is an immense advantage.

The whole mealie crop has now been expeditiously shelled as indicated.

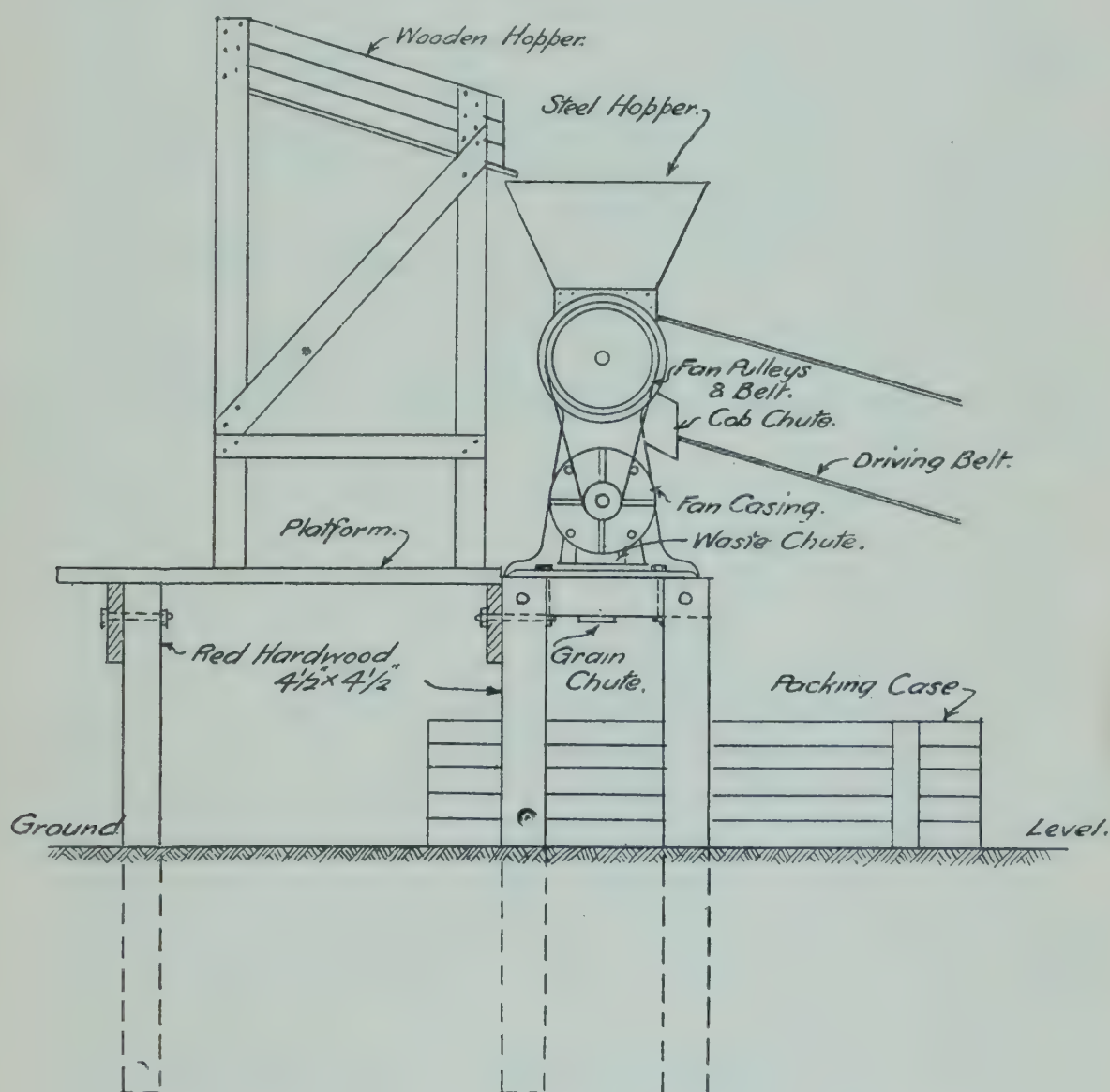
An important point seems to be that the sheller, being all steel, very well made and equipped with good bearings, grease caps, etc., will outlast many wooden framed 2-hole shellers, and it is thought for this reason alone it is a cheaper proposition in the long run.

It was noticed that the boys made no attempt to slack off; the machine appeared to keep them working at top speed.

After the mealie crop had been cleaned up, some 10 acre of sunflowers had to be threshed and a trial was made with this crop through the sheller.

The result was so satisfactory that the whole crop was put through; commencing at 2 p.m. and finishing at 5 p.m., the machine being fed as fast as the heads could be stuffed into the hopper.

All good seed and some heavy pieces of broken head came through the grain chute correctly; the larger pieces of broken head were passed out of the cob chute and the suction fan dealt faithfully with the trash.



The seed was later cleaned without difficulty by a winnower.

The writer has little experience of threshing sunflowers, but the pile of heads waiting attention looked formidable and would have taken a considerable time to handle in the ordinary way.



The next crop which required threshing was velvet beans for seed for green manuring—24 bags of hard black pods which looked extremely uninviting, and the writer was at a loss to know how to handle them.

Once again the mealie sheller was tried, a petrol tin of pods being gingerly put into the hopper with most excellent results, and forthwith two boys and the “baas” put 24 bags of pods through in 24 minutes.

Within about one-and-a-half hours of commencing, 3 bags of seed velvet beans were sewn up and in the store-room ready for planting in due season. The two boys were away on another job, and the “baas” was happily drinking his afternoon tea and explaining to a neighbour just how velvet beans should be shelled.

The 6 h.p. engine is, of course, used for other work, usually with a feeder grinder which cost £16.

This grinder, amongst other things, expeditiously, cheaply and cheerfully grinds up the following for cattle and poultry feeds:—

Monkey nuts with shells into meal.

Corn and cob meal.

Mealie meal.

Crushed mealies.

Air dried sunflower leaves into meal.

Sunflower heads into meal.

Crushes charcoal for poultry.

Velvet bean and pod meal.

Monkey nut hay into meal.

The engine is extremely efficient, gives little or no trouble, and runs on any of the advertised power paraffins, and will go on running so long as the tank contains the “mooti.”

The writer is frequently obliged to start the engine to work grinding or shelling and leave the boys in charge while other matters receive attention.

Should the belt run off the pulley, as has happened, or should it be necessary to stop for any other reason, the boys know how to stop the engine, but are not allowed to start it; normally the engine does not stop work until the paraffin is cut off.

## Better Farming.

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We have received the following very interesting communication from Mr. W. H. McFadzean, Bauhinia, Banket. A reference to this subject is made in our editorial columns:—

In your April issue of the *Agricultural Journal* there appeared, under the heading of “The Good Farmer,” an excellent lecture on general farming methods and a plea for better farming based on the findings of the Government experts from trials at the Experimental Stations, which have been verified on a larger scale on the Gwebi Demonstration Farm.

Unfortunately the advice given appeared towards the end, instead of at the beginning, of the growing season, but farmers, having once more realised the folly of continuous cropping of maize, should be again induced to prepare for crop rotation in the coming year.

That the “scolding” was deserved by the majority of farmers is admitted, but it was just a little severe, and the answers to the questions on the application of sound and proved scientific farming were all in the negative. There are, however, many farmers trying to adopt better farming methods and to increase their capital in the fertility of their soils, and to show the beneficial returns from land rotated and manured in 1927 for other crops, and planted to maize in 1928, I give the following convincing figures:—

*Rotation Crop, 1925—Cotton.*—10 acres maize treated with 300 lbs. per acre bone and superphosphate (following pumpkins in 1926, which received a dressing of kraal manure broadcasted):—

Average maize yield, 1927-28: 24 bags per acre.

Highest acre yield: 30 bags.

*Rotation Crop, 1925—Pumpkins with Farm Manure.*—10 acres maize without further fertiliser treatment (following fire-cured tobacco in 1926, which received farm manure and fertiliser broadcasted):—

Average maize yield: 18 bags per acre on very badly ploughed land.

But for five weeks' drought their yields would have been much higher. Owing to tobacco receiving all the labour, the maize crop was neglected at the proper time for cultivation, and was only once cultivated and once weeded and suckered.

Maize on land cropped continuously to maize for six years, though fertilised this year, gave under 10 bags per acre, while a few acres planted too late gave very poor results indeed.

The low average yield of maize per acre over Rhodesia as a whole is not a credit to the farmer. But if growers would be contented to plant only where a good crop was certain and to plant only good seed at the right time, the average yield could be doubled. Better stock is required for better farming, as this means the growing of crops for feeding purposes, and the consequent increase in manure available for the lands. I doubt if "stores" or young bullocks of suitable breeding are available in sufficient quantity for the maize farmer for fattening, and efforts should be made to procure supplies for distribution throughout the maize belt.



# Dairy Buildings in Southern Rhodesia.

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## A SMALL FARM DAIRY.

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By B. G. GUNDRY, A.I.Mech.E.

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The site of a dairy requires rather careful consideration, since its utility will be considerably impaired if it is badly situated. The spot selected should be one where the building will be exposed to the prevailing winds, and care should be taken that it will not be in the path of dust raised by traffic on a nearby road or yard. It should also be as far removed as possible from stagnant water, a dungstead or other habitat of flies and other insects. At the same time it should be conveniently situated with regard to the cow byres, and it is a great convenience if there is a good water supply at hand.

In the above connection, attention is called to the regulations embodied in the Dairy Produce Act of 1925, where it is stated: (1) that no person shall . . . erect or use any premises as a creamery, cheese factory, cream depot, butter dairy, cheese dairy or room used for separating purposes or storing of cream or milk within a distance of 300 feet from any piggery, manure heap or offensive stagnant water, and (2) that the room used for separating purposes must be at a distance of not less than 50 feet from any milking shed or kraal; and (3) that no person shall permit any offensive or decomposing liquid to be or to flow within a distance of 300 feet from any creamery, cheese factory, cream depot, butter dairy, cheese dairy or room used for separating purposes or storing of cream or milk, unless in a drain properly constructed to the satisfaction of the inspector.

If the dairy is roofed with thatch, which is recommended, on account of coolness, the question of fire insurance must

also be considered. Generally speaking, Fire Insurance Companies insist that a building with a thatched roof must be separated from other buildings having iron or other non-inflammable roofs by a distance of at least 20 feet, failing which the latter buildings may also be liable to the higher rate of premium which is applicable to that with the thatched roof.

**Foundations.**—The foundation trenches must be carried down until a good compact formation is encountered, and in most cases a depth of from 18 ins. to 24 ins. is sufficient. The bottom of the trenches, which should be as level as possible, should be well rammed to solidify the sub-soil still further and to ensure that there are no soft patches, which, if found, must be further rammed until sufficiently hard.

The first three or four courses of brickwork should be 18 ins. wide, followed by 14 in. work until the ground level is reached, when the 9 in. walls may be commenced. At a height of 6 ins. to 9 ins. above the ground level, the brickwork should be carefully levelled off ready to receive the damp course. Only good hard well-burnt bricks should be used for the foundations, and they may be laid in lime mortar of one part lime to 3 or 4 parts of clean pit sand or fine river sand. On no account should dagga be used for laying foundations.

The damp course may be of felt or 26 G. galvanised iron. If iron is used, the sheets should be cut into strips 12 ins. wide, and each strip should overlap its neighbour by about 6 ins., and, for preference, every joint should be soldered; but failing this, the strips should be turned over, hooked together and hammered flat, care being taken not to damage the galvanising unduly or the iron will soon rust through.

The damp course must project as far as possible on the inside of the wall, so that later it can be thoroughly embedded in the concrete floor.

**Walls.**—In this design the walls are built solid, no insulating air cavity being left, as it is considered that with a verandah provided on all sides the building will be kept sufficiently cool.

If good building dagga is available it may be used for building the walls, although lime mortar of one part lime to 4 or 5 parts of sand is strongly recommended, as it is not so readily penetrated by insects.

The door and window frames are built in as the brickwork proceeds, being secured in position by strips of hoop iron screwed to the woodwork and built into the walls at intervals of five or six courses.

Two or three apertures about 6 ins. by 9 ins. should be left near the top of each wall for ventilation, and should be covered with mosquito gauze.

**Verandah.**—While the walls are being built the concrete footings for the verandah poles may be placed, so that they will be set by the time the roof is to be put on.

The mixture for the concrete should be 1 part cement, 3 parts sand and 6 parts stone broken to pass a  $1\frac{1}{2}$  in. ring. If the ground is sufficiently firm, square holes 9 ins. by 9 ins. may be dug to the requisite depth and filled with the concrete, a wooden mould about 4 ins. to 6 ins. high being used to support the concrete above the ground level. Otherwise, old petrol tins can be embedded in the ground and used as moulds.

As the concrete is being filled in, the iron straps, which must have been previously drilled for the bolts, must be inserted, and may be held in the correct position by strips of wood resting across the top of the mould. These footings are shown in detail in the accompanying drawing.

The concrete should be given at least seven days to set before the poles are bolted to the iron straps. These poles may be either of native timber or gum poles 4 ins. to 5 ins. in diameter, or, if preferred, 3 ins. square imported timber may be used. These uprights having been erected, the plate or bearer on which the rafters rest may be placed in position and secured to the uprights by strips of hoop iron. Here again either locally-grown timber, of approximately the same diameter as the uprights, or imported timber  $4\frac{1}{2}$  ins. by 3 ins. may be used as desired.

It must be remembered, however, that practically all native timbers and gum woods require to be chemically



treated to render them immune from attack by white ants and borers. Such a treatment, which can be carried out in an ordinary cattle dip, is fully described in the article entitled "Indigenous Timbers for Fencing," which appeared in the *Rhodesia Agricultural Journal* for October, 1924.

**Roof and Ceiling.**—The roof should have a pitch of not less than  $45^{\circ}$ , and the type of main principal recommended is shown in the accompanying drawing.

It is assumed that native timber or gum poles will be used for all the roof timbering with the exception of the tie beams, ceiling joists and wall plates, and the diameter, length and number required of the various members are shown in the schedule of quantities.

The roof principals should preferably be bolted together with  $\frac{3}{8}$  in. or  $\frac{1}{2}$  in. diameter bolts, and should be secured to the walls by strips of hoop iron built into the top six courses of brickwork.

A louvre ventilator should be built into the two end principals to ensure the roof being thoroughly ventilated. These may be rectangular, as shown in the drawing, and the surrounding space filled in with 26 G. galvanised iron, or the slats may be taken right across to fill the triangle completely.

The thatch should project about 12 ins. over these louvres and it will therefore be necessary to use wooden purlins for this part of the roof. The remainder of the thatch can be supported by purlins of 10 gauge fencing wire secured to the rafters by iron staples.

The cheapest type of ceiling is of ordinary ceiling boards, which are also the easiest to fix; but they have the disadvantage of shrinking and warping badly and admitting dust from the thatched roof above. As an alternative, flat galvanised iron of 26 or 24 gauge may be used, but this will require a small amount of extra timber to support it and is somewhat more difficult to fix. The principals must be placed so that the distance from the centre to centre of the tie beams is exactly 3 feet, as this is the width of the sheets of iron. Cross members, known as brandering, consisting of 3 ins. by  $1\frac{1}{2}$  ins. imported timber, must be cut to the required length and nailed between the tie beams at intervals of 2 feet apart, so that their bottom edge is flush with the bottom edge of the







tie beams, thus presenting a level framework to which the sheets of iron are nailed. Strips of ceiling board cut 2 ins. wide are then tacked on the under side of the iron to give it further support and to cover the joints.

**Floor.**—The floor should be of concrete, 1 part cement, 3 parts sand and 6 parts of stone laid on a 6 in. bed of hardcore which has been well consolidated by ramming. Full instructions for the laying of concrete floors are contained in the article entitled "Concrete on the Farm," which appeared in the *Rhodesia Agricultural Journal* for April, 1926, and reprinted as Bulletin No. 588.

**General.**—Two doors should be provided, the outer one consisting of a light wooden framework covered with mosquito gauze and an inner one made from ordinary flooring boards. These doors can be purchased ready made if required.

Glazed windows are not absolutely necessary, but may be fitted if required, in which case they should be hung on the inside of the window frame, so that they open flat against the wall. In the drawing glazed windows are dispensed with and wooden shutters made from flooring boards are hung on the outside of the frame. These can be closed when necessary to exclude dust, etc.

In any case the window openings should be provided with mosquito gauze screens.

A cement-plastered brick cooling trough with a drain pipe should be built under the window facing the prevailing winds.

The trough should be built as shown in the detail drawing and plastered with a mixture of one part cement and three parts of sand.

A bench consisting of a concrete top resting on brick pillars is also recommended. The concrete top should be cast in convenient sized slabs from two to three feet long and four inches thick. The mixture used should be one part cement, two parts sand and four parts stone. The slabs should be given at least two weeks to set before being placed in position on the brick supports, and during that time they must be kept damp with wet sacks or grass.

The inside of the walls should be plastered to a height of two feet six inches with cement mortar, one part cement to four parts of sand, and the angles between the walls and floor should be carefully rounded to facilitate cleaning.

The upper part of the walls should be plastered with ordinary lime mortar.

**Cost.**—The estimated cost of materials *ex* Salisbury, as shown in the schedule of quantities, is approximately £46; this figure includes farm-made bricks at 12s. 6d. per thousand and a small cartage charge only for sand and stone. The cost of native timber is not included.

### SMALL FARM DAIRY.

#### *Schedule of Quantities of Materials.*

Item.	Number or quantity.	Description.	Cost.
			£ s. d.
Foundations ... ..	2,200	Bricks	8 2 6
Walls ... ..	8,000	"	
Verandah floor ... ..	2,200	"	
Cooling trough ... ..	350	"	
Lime ... ..	14 bags	"	
Concrete floor ... ..	7 "	Cement ...	4 11 0
	1½ cubic yards	Sand ...	0 3 0
	3 " "	Stone ...	0 12 0
Damp course ... ..	4 sheets	26 G. galv. iron	0 19 0
Walls, cement plaster ... ..	1½ bags	Cement ...	1 1 0
	½ cubic yard	Sand ...	0 1 0
" lime plaster ... ..	2 bags	Lime ...	0 13 0
	1 cubic yard	Sand ...	0 2 0
Verandah, concrete footings for posts	1½ bags	Cement ...	1 1 0
	⅓ cubic yard	Sand ...	0 1 0
	⅔ "	Stone ...	0 3 0
Concrete bench top ... ..	1½ bags	Cement ...	1 1 0
	⅓ cubic yard	Sand ...	0 1 0
	⅔ "	Stone ...	0 3 0
Iron straps for verandah posts ...	17 x 2 ft. long	2 x ¼ ins iron	1 10 0
Ridging ... ..	2 sheets	26 G. galv. iron	0 9 6
Flashing and filling for louvres ...	3 "	"	0 14 3
Hoop iron ... ..	1 bundle	"	1 10 0
Drain pipe for trough ... ..	3 feet	2 in. W.I. pipe	0 4 0
Elbows for above ... ..	2 "	2 in. elbows ...	0 2 6
Mosquito gauze, galvanised ... ..	5 yards	4 feet wide ...	0 14 0
Screws, nails, hinges, bolts, etc. ...		(say)	5 0 0

*Timber.*

Item.	Section.	Length.	Number.	Cost.
		Feet.		£ s. d.
Roof principals: tie beams ...	6 x 1½ ins.	16	4	1 4 0
rafters ...	3-4 in. butts	12	8	
king posts ...	„	8	4	
struts ...	„	6	8	
Ridge pole ...	„	11	1	
Wall plate ...	4½ x 1½ ins.	17	2	0 9 3
	„	15	2	0 8 0
Ceiling joists ...	6 x 1½ ins.	16	2	0 12 0
„ boards ...	6 x ½ ins.	16	28	3 15 0
„ cornice ...	3 ins.	16	2	0 6 0
„	„	14	2	0 5 6
Purlins, for ridge, timber ...	1½-2 in. butts	11	10	
„ 10 G. galvanised wire ...	10 G. ½ roll	...	...	0 15 0
Hip rafters ...	4 in. butts	19	8	
Verandah rafters for ends ...	4 in. butts	15	6	
„ „ „	„	9	4	
„ „ sides ...	3-4 in. „	9	12	
„ jack rafters ...	„	5	8	
„ posts... ..	4-5 in. butts	7	17	
„ plate ...	„	15	4	
„	„	16	4	
Louvres, frame... ..	4½ x 1½ ins.	9	4	0 9 9
„ slats (ceiling boards) ...	6 x ½ ins.	10	4	0 6 8
Batten door (flooring) ...	6 x 7⁄8 ins.	13	3	0 9 9
„ „ „	„	8	1	0 2 0
Mosquito-proof door ...	3 x 1½ ins.	13	1	0 2 6
„ „ „	„	8	2	0 3 0
Door frame ...	4½ x 3 ins.	10	1	0 6 0
„ „ „	„	7	1	0 4 0
Mosquito gauze screens for window openings	4½ x 1½ ins.	9	4	0 9 9
Shutters for window openings	„	12	2	0 6 6
(flooring)	6 x 7⁄8 ins.	16	6	1 4 0



## The Time, and how to Find it.

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*Originally written by the Rev. Father Goetz, S.J., Observatory, Bulawayo, and published in the Rhodesia Agricultural Journal of June, 1909.*

*The present article has been rewritten by N. P. Sellick, M.C., B.Sc. (Eng.), Hydrographic Engineer, but the tables and methods have been drawn largely from the original article.*

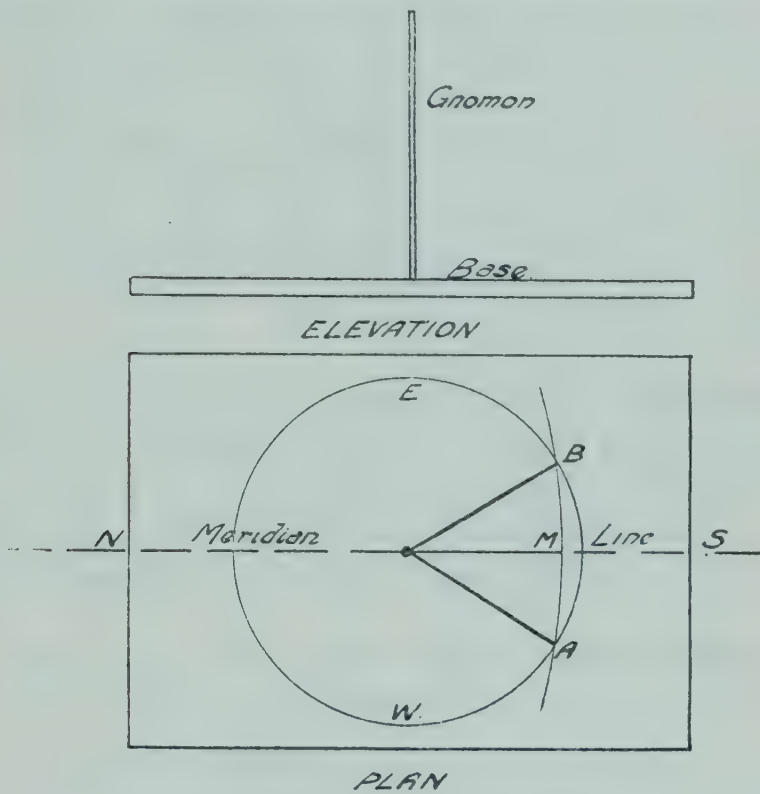
**Time.**—Time is a measure of the succession of events. It is a matter of experience that if an observer choose any particular event as the datum all events may be grouped into three classes, those occurring earlier than the event chosen as datum, those occurring simultaneously with it and those occurring later than the event. An observer can therefore arrange a series of events in order of time. It is generally assumed that all observers of the same events will arrange the events in the same order of succession. This assumption (which is being assailed by some modern physicists) raises the conception of time from the local to the absolute.

The above rough method of considering time is greatly improved by the devising of instruments which will move uniformly through a cycle of events and thus provide a measure of interval which can be applied to external events.

The most perfect of instruments for this purpose has been provided in the earth which rotates uniformly round an axis passing through the north and south poles.

**Latitude and Longitude.**—The surface of the earth, for geographical reasons, is divided by lines of longitude and latitude (see fig. 2). A line of longitude is the trace on the surface of the earth of a plane which passes through the north and south poles. The axis of the earth lies in this plane. To an observer on the earth at a point on the line where the plane cuts the surface the line of intersection will be a true north and south line. The plane will extend vertically above him and form his meridian. The line of inter-

section continues completely round the earth and is divided into two equal parts by the poles. These two parts are quite different from the point of view of time and most other phenomena and are therefore given different names. A line of longitude therefore refers only to the one line from the



PLAN  
Figure 1

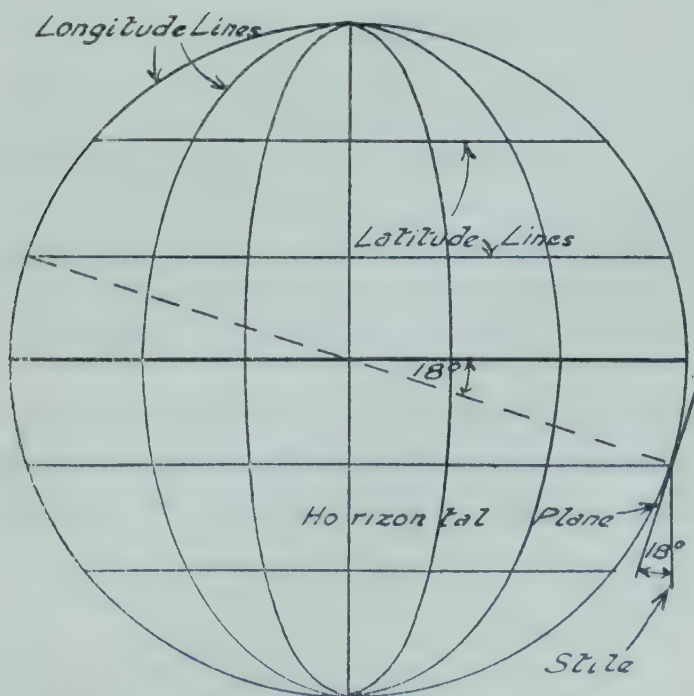


Figure 2

north to the south pole. An infinite number of these lines could be traced on the earth, all meeting at the poles. Conventionally there are 360 of these lines called degrees of longitude and the intervals are divided to minutes and seconds. The line of longitude passing through Greenwich is usually denoted as the zero line and measurements are made to the east and west of this line. Lines of latitude never intersect one another, as they are drawn parallel to the equator. Their position is also denoted in degrees, minutes and seconds, measured from the equator; the importance of the measure of latitude in this article is that the measure of the latitude in degrees is also the measure of the inclination of a horizontal plane to the axis of the earth.

**Sidereal Day.**—If an observer at any point on the earth notes the intervals of the successive passages of a fixed point (a star) across his meridian he will have a measure of time interval. This particular interval is the only absolutely reliable interval known and is called the sidereal day.

**Mean Solar Day.**—Observations of the sun show that the intervals of successive passages are not equal; owing to the varying velocity of the earth's passage round the sun the solar day has two maxima and two minima during the year. The sidereal day, however, is inconvenient for ordinary purposes, and in consequence a mean solar day has been determined, which is the mean interval between successive passages of the sun across the meridian. It will be seen that the sun will be alternately in advance and behind this time. On four days in the year, 15th April, 15th June, 1st September and 24th December, the sun will cross the meridian at mean noon. A hypothetical sun which crosses the meridian every day at mean noon is called the mean sun.

**Equation of Time.**—The correction which has to be applied to the sun's time to find the mean solar time is called the equation of time and is shown in the accompanying Table I.



TABLE I.

**Equation of Time.**

(1) Minutes to be added to the time marked by the sun's shadow. (From 25th December to 16th April and 15th June to 1st September.)

December.		April.	
Date.	m.	Date.	m.
25 ... ..	0	1 ... ..	4
27 ... ..	1	5 ... ..	3
29 ... ..	2	8 ... ..	2
31 ... ..	3	12 ... ..	1
		15 ... ..	0
		16 ... ..	0
January.		June.	
2 ... ..	4	14 ... ..	0
4 ... ..	5	15 ... ..	0
6 ... ..	6	19 ... ..	1
9 ... ..	7	24 ... ..	2
12 ... ..	8	29 ... ..	3
14 ... ..	9		
17 ... ..	10	July.	
20 ... ..	11	4 ... ..	4
24 ... ..	12	10 ... ..	5
28 ... ..	13	19 ... ..	6
February.		26 ... ..	6 $\frac{1}{2}$
4 ... ..	14	27 ... ..	6 $\frac{1}{2}$
11 ... ..	14 $\frac{1}{2}$		
20 ... ..	14	August.	
27 ... ..	13	3 ... ..	6
March.		12 ... ..	5
4 ... ..	12	17 ... ..	4
8 ... ..	11	22 ... ..	3
12 ... ..	10	25 ... ..	2
16 ... ..	9	29 ... ..	1
19 ... ..	8		
22 ... ..	7	September.	
26 ... ..	6	1 ... ..	0
29 ... ..	5		

(2) Minutes to be subtracted from the time marked by the sun's shadow. (From 16th April to 15th June, and 1st September to 25th December.)

April.		October.	
Date	m.	Date	m.
16 ... ..	0	4 ... ..	11
20 ... ..	1	7 ... ..	12
25 ... ..	2	11 ... ..	13
		15 ... ..	14
		20 ... ..	15
		27 ... ..	16
May.		November.	
2 ... ..	3	3 ... ..	16 $\frac{1}{2}$
15 ... ..	3 $\frac{5}{8}$	10 ... ..	16
28 ... ..	3	17 ... ..	15
		21 ... ..	14
		25 ... ..	13
		28 ... ..	12
		31 ... ..	11
June.		December.	
4 ... ..	1	4 ... ..	10
14 ... ..	0	6 ... ..	9
		8 ... ..	8
		10 ... ..	7 $\frac{1}{2}$
		13 ... ..	6
		15 ... ..	5
		17 ... ..	4
		19 ... ..	3
		21 ... ..	2
		23 ... ..	1
		24 ... ..	$\frac{1}{2}$
		25 ... ..	0
September.			
1 ... ..	0		
4 ... ..	1		
7 ... ..	2		
10 ... ..	3		
13 ... ..	4		
16 ... ..	5		
19 ... ..	6		
22 ... ..	7		
25 ... ..	8		
27 ... ..	9		
30 ... ..	10		

**Local Time.**—It will be noted above that time has always been referred to an observer on a particular line of longitude. If, however, an observer move to the east or west of his original position, he will be altering his meridian and the time at which the sun passes his meridian will also be altered as compared with the originally determined time. If the observer move towards the east or sunrise, the sun will cut his meridian earlier; to the west, later. Time determined for the position of an observer is called local mean solar time. The earth rotates on its axis once in 24 hours with reference to the sun; thus the sun passes through the





Implement display at Salisbury Show, 1928.



Forest products at Salisbury Show. A lecture by an official of the Forestry Branch, Department of Agriculture, is in progress.





meridians of  $360^\circ$  of longitude in this period, or  $15^\circ$  of longitude in an hour, each degree of longitude representing 4 minutes. If two observers situated one degree of longitude apart set their clocks accurately to local mean solar time, it will be found that the clock of the more easterly observer is 4 minutes ahead of the other.

**Standard Time.**—To avoid this difficulty, neighbouring countries usually agree to keep the time of a convenient meridian in their territory. This meridian is usually fixed a convenient time ahead or behind Greenwich. The whole of South Africa keeps the time of  $30^\circ$  E. longitude, which is 2 hours ahead of Greenwich. On this account Capetown, which is only  $18\frac{1}{2}^\circ$  E. of Greenwich, enjoys “summer” time all the year round.

**Finding the Time.**—With the resources at the disposal of an ordinary individual the sun provides the best method of determining the time. It must be borne in mind, however, that time as determined by the sun is local sun time; it is therefore necessary to apply to this the equation of time to determine mean local solar time and further to correct the result to standard time. The latter is achieved in this country by adding 4 minutes for every degree W. of  $30^\circ$  E. longitude and subtracting 4 minutes for every degree E.

**To Find the Time for Setting a Clock.**—The simplest method for the above is by use of the tables of sunrise and sunset as published in the daily papers. A clear horizon is necessary and naturally intervening kopjes or other obstructions will spoil the method. The time to take the observation is at the first appearance of the upper edge at sunrise or the last appearance at sunset. In using the tables it must be remembered that the time given is corrected to the place for which the tables are made. Thus if the tables are for Bulawayo (these usually appear in Letts’ Diary) the time of sunrise and sunset at any other point will be earlier or later according as the point is east or west of Bulawayo. At the end of March and September any table for a town in Southern Rhodesia may be used with the correct longitude correction. Towards mid-winter and mid-summer, however, the latitude of the station becomes important, and unless the station for which the tables have been made out is within one degree of latitude of the point at which the time is desired con-

siderable errors will be involved. This method is very approximate at best, but will give the time within a few minutes.

**Gnomon Method.**—A gnomon in its simplest form is a thin straight rod planted plumb on a level surface. A thin knitting needle placed vertically on a piece of shelving would be suitable. It is obvious that, if the gnomon is plumb and the board horizontal, when the sun is in the meridian the shadow of the gnomon will lie along the meridian line. This will give "sun" or true noon. The problem to be solved is finding the direction of the meridian. This is most easily found in late June when the sun is lowest in the sky and therefore throws the longest shadow. Draw a circle on the board with the foot of the vertical rod as centre. The circle should be of such a size that the shadow of the rod is shorter than the diameter of the circle at noon, but not very much shorter. The shadow of the tip of the rod will then cut the circle some time before noon at a point A and some time after noon at a point B (see diagram, fig. 1). The correct size of the circle can be determined by observing the path at times during one day.

If a line be drawn between A and B and bisected as shown at M, then the line drawn from the bottom of the gnomon or vertical rod through the point M is in the true meridian. As is shown in the diagram, the meridian line should be produced beyond the bottom of the gnomon to allow for the reversal of the shadow in mid-summer.

With a gnomon made and oriented as described above the shadow of the rod will fall on the meridian line at true noon each day. It will be necessary to correct true noon to standard time. An application of the equation of time (Table I.) will reduce sun time to local mean time, and then the longitude correction must be applied to obtain standard time. The order in which the corrections are applied is immaterial.

Take, for example, a farm situated in longitude  $32^{\circ} 15'$  E. On the 4th June, the shadow of the gnomon is in the meridian at 11.35 a.m. by the farm clock. The time according to the sun's shadow is noon (12.00). From Table I. it is seen that this must be corrected by -1 minute. So that



local mean time is 12.00-1 or 11.59 a.m. Now, standard time in this country is based on  $30^{\circ}$  E., so that local mean time is  $2^{\circ} 15'$  of arc or 9 minutes fast on standard time. We then have  $11.59-9=11.50$  a.m. as standard time on the farm, and the farm clock is 15 minutes slow. The first correction may be looked on as a variable error in our clock, the sun, and must be looked up for every observation; the second is an error of position, and remains constant and must be applied to all readings. As the second correction is constant, it will be found convenient to combine it with the first and form a new table for the farm. For example, the farmer in longitude  $32^{\circ} 15'$  E. would correct each figure by -9 minutes. In the first part of the table (minutes to be added) each figure would be diminished by 9; thus on 31st December he would no longer add 3 minutes, but would subtract 6. On the 14th of January, sun time and standard time would be the same. In the second part of the table (minutes to be subtracted) all the figures would be increased by 9. On the 2nd of May, 12 minutes would be subtracted, and on the 10th of November, 25 minutes would be subtracted.

An alternative method of setting the gnomon may be used if a reliable watch is available. Take the previous case cited. A watch is available, which is set correct to post office time. Owing to the farm being in longitude  $32^{\circ} 15'$  E., the sun will always be 9 minutes fast. On the 4th June, by Table I. it is in addition 1 minute fast, therefore the sun will be in the meridian at 11.50 a.m. standard time. If the position of the shadow is then marked at 11.50 a.m. by the correct watch, the mark will be in the true meridian. By the use of this method it is seen that the shadow of a pole, a window edge or door jamb suitably placed will serve to mark true noon. The usual corrections of course will have to be applied.

**Sundials.**—The methods described above are somewhat inaccurate at best and are only available at certain times of the day. The sundial, on the other hand, if well made and set up, will give the time whenever the sun is shining and should be considerably more accurate.

This type of sundial consists essentially of a horizontal plate into which is planted a rod or "stile" which lies parallel to the axis of the earth (see diagram 2). To point

the stile parallel with the axis of the earth two adjustments are necessary. First it must be oriented to lie in the plane of the meridian (this can be found by the gnomon method); and secondly it must lie at a certain angle to the horizontal.

Figure 3

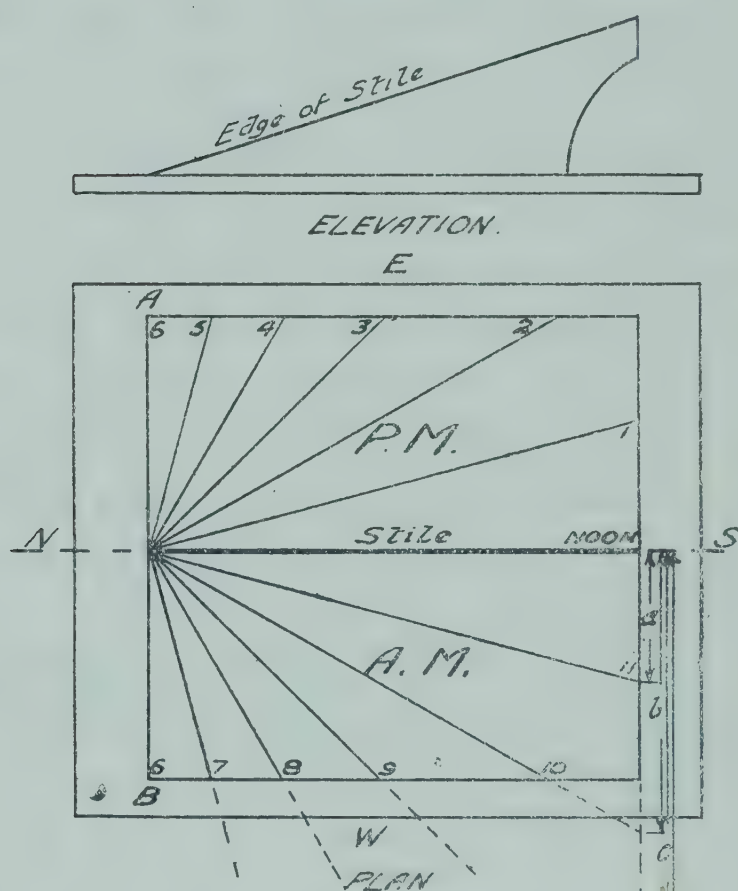


Figure 4

It was explained earlier that the latitude of a place is the measure of the inclination of the earth's axis to a horizontal plane at the point. Therefore, if the stile is given this angle to the nearest half degree, the conditions will be satisfied.

It is usual for convenience to replace the rod by a wedge-shaped plate. The angle of the wedge (fig. 3) is made equal to the latitude of the place. The wedge is then secured perpendicular to the horizontal plate and the plane of the wedge placed in the meridian as described for the gnomon.

A table is given below which, taken in conjunction with figure 3, will enable anyone to mark out a stile to suit the locality.

Draw a line A B of 12 inches in length. At one end, say B, draw a line making with A B a right angle; on this line cut off a portion B C equal to the number given below, the required latitude in the table. Join C A. The angle A will be the required angle.

The numbers given in the table are inches and 32nds of an inch.

TABLE II.

Latitude	...	21° 30'	21°	20° 30'	20°	19° 30'	19°
Inches and 32nds	...	4 -23	4 -19	4 -15	4 -12	4 - 8	4 - 4
Latitude	...	18° 30'	18°	17° 30'	17°	...	...
Inches and 32nds	...	4 - 0	3 -29	3 -25	3 -21	...	...

The upper edge of the stile, which replaces the rod, will throw the shadow from which the time will be read. It is important therefore that this edge be made straight and sharp.

It will be found if the above primitive sundial be set up correctly that the shadow of the stile will fall along the stile at true noon. Before noon the shadow will be to the west and after noon to the east of the stile. The edge of the shadow should be a straight line radiating at an angle from the point where the upper edge of the stile and the plate meet.

The graduating of the dial may be carried out as follows (see figure 4):—A line A B is drawn along the plate at right angles to the line of junction of the stile and plate and passing through the point where the edge of the stile meets the plate; the eastern portion of this line represents 6 p.m. sun time and the western edge 6 a.m. sun time. We now have three points: 6 a.m., noon, and 6 p.m. These



graduations are the same for any sundial. The remaining hours may be marked according to Table III. The length shown in the table is measured as shown in figure 4.

Measure exactly 12 inches on the meridian line towards the south, from the point where the stile enters the horizontal plane. At the point thus determined draw a line across the meridian line, at right angles to it; on this line mark off distances from the meridian line as found in the following table, the first number being inches, the second 32nds of an inch.

TABLE III.

Distance of the hour line from the meridian line in inches and 32nds of an inch.

At Latitude	...	11 and 1	10 and 2	9 and 3	8 and 4	7 and 5
21° 30'	...	1— 6	2—17	4—13	7—20	16—13
21°	...	1— 5	2—15	4—10	7—14	16— 1
20° 30'	...	1— 4	2—14	4— 7	7— 9	15—22
20°	...	1— 3	2—12	4— 3	7— 3	15—10
19° 30'	...	1— 2	2—10	4— 0	6—30	14—30
19°	...	1— 1½	2— 8	3—29	6—24	14—18
18° 30'	...	1— 1	2— 6	3—26	6—18	14— 6
18°	...	1— 0	2— 4	3—23	6—13	13—26
17° 30'	...	0—31	2— 2½	3—19	6— 8	13—15
17°	...	0—30	2— 1	3—16	6— 2	13— 3

A sundial of the above pattern may be made of any size. It should preferably be made of metal and the length of the stile should be from 6 to 12 inches. The plate may be square with its sides a little larger than the length of the stile. Should wood be used it should be well seasoned and it will be necessary to take the instrument in at night, also a wooden stile will have an appreciable thickness. This in itself is no disadvantage, but it should be remembered that the two edges will be acting independently, one a.m. and the

other p.m. The meridian line will then be drawn as thick as the edge of the stile and the graduations must be measured from the two edges of the meridian line and not from the centre.

The sundial described here is known as the horizontal type and is fairly readily obtainable. Unfortunately, as is shown in Table III., the hour marks depend on the angle between the stile and the plate, so that it is not too easy to obtain a dial suited to any particular latitude. I would point out, however, that any sundial of this type may be set up in any latitude and will work correctly provided that the edge of the stile is parallel to the earth's axis. If the dial happens to have been constructed for another latitude, then the plate will be set, not horizontal, but at an angle calculated as follows. Take the case of a dial made for latitude  $50^{\circ}$  and used in latitude  $18^{\circ}$ . To obtain a slope of  $18^{\circ}$  in the stile it will be necessary to incline the plate  $50^{\circ}-18^{\circ}$  or  $32^{\circ}$  in the opposite direction.

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## Tobacco Consumption.

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### INCREASE OF "EMPIRE" SMOKING.

#### PIPE AND CIGARETTE.

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The expansion of the world's consumption of tobacco, the decline in popularity of pipes relatively to cigarettes, the striking increase in the demand for Empire tobacco, and the general recent improvements in its quality are among the main points discussed by the Imperial Economic Committee in their Tobacco Report, published by H.M. Stationery Office (Cmd. 3168, price 9d. net). The problems facing those responsible for the future of the still small but important Empire tobacco trade receive detailed attention in this survey.

In 1921, states the Report, the Empire supplied 3.3 per cent. of the leaf tobacco imported into the United Kingdom, and in 1927 the figure had risen to 18.4 per cent. It is estimated that 37 per cent. of the pipe tobacco consumed in the United Kingdom in 1927 consisted of Empire leaf, but only slightly over 1 per cent. of the cigarette tobacco. Over 250 brands of Empire tobacco and 40 to 50 brands of Empire cigarettes have been placed in the British market.

While in 1914 the annual average consumption in the United Kingdom was 2.4 lbs. per caput of the population, in 1927 3.4 lbs. were consumed, "indicating a rapid increase, due undoubtedly to the extension of the cigarette habit and to smoking on the part of women." Strictly comparable statistics for other countries were difficult to obtain, but it has been estimated that in 1926 Belgium's consumption was 6.6 lbs. per caput, U.S.A.'s 6.02 lbs. and Germany's 4 lbs.

### TRIUMPH OF CIGARETTES.

A striking feature in the United Kingdom has been the change in recent years from pipes to cigarettes. In 1907 cigarettes accounted for 23.8 per cent. of the total, as against 71.1 per cent. pipe tobacco and 5.1 per cent. cigars; in 1924 cigarettes had risen to 58.5 per cent. and pipes and cigars had fallen respectively to 40 per cent. and 1.5 per cent.

"The evidence we have received from trade sources," the Committee adds, "is to the effect that the trend to cigarette smoking has continued since 1924, and some witnesses considered that pipe tobaccos now account for only one-quarter of the consumption in the United Kingdom. It is, we think, probable that pipe tobacco does not now form more than 35 per cent. of the total tobacco consumption of the United Kingdom."

The advance of the cigarette in popular favour in recent years is not confined to the United Kingdom. Throughout Europe consumption now inclines towards cigarettes and the milder varieties of pipe tobaccos.

Even in Germany, where pipe tobacco still predominates, a marked increase in the consumption of cigarettes has taken place. In the United States, pipe and chewing tobacco still is the greater part of the consumption, but the proportion of



cigarettes is increasing. Even in India the annual consumption of cigarettes is now about 6,500 million, as compared with an annual figure of somewhat under 1,000 million pre-war. The cigarette is thus at present advancing in world-wide favour, but the consumption per head appears to be highest in the United Kingdom.

### WORLD PRODUCTION.

The position of world supplies receives full analysis.

For the years 1909 to 1913 the average annual world production of leaf, excluding India and China, was estimated, states the Imperial Economic Committee, at 2,304 million lbs. For the years 1920 to 1922 this average was placed at 2,673 million lbs., and in 1926 it is computed that 3,415 million lbs. of tobacco leaf were harvested. Unfortunately equivalent figures for the earlier years are not available for India and China, for which two countries the crop in 1926 was estimated at 1,485 million lbs. If this quantity be included, the estimate of the total production of tobacco in the world in 1926 was 4,900 million lbs. The United States of America and the British Empire provided approximately half of this world total.

Empire countries contributing to this quota were, in the order of their output, India, Canada, Union of South Africa, Southern Rhodesia, Nyasaland, Northern Rhodesia, Australia and Cyprus.

In the international trade in tobacco the Empire does not, however, occupy such a prominent position as the quantity of its production would suggest, for some of the countries which are the largest producers of tobacco are also the largest consumers. This is especially true of India and China. Only somewhat over one-fourth of the world crop—1,240 millions out of 4,600 million lbs. in 1925—entered international trade channels, the rest having been consumed in the countries of production. Over three-fourths of the total export surplus of the world in 1925 was provided by the United States (39 per cent. of the total), the Dutch East Indies and the Balkans (each 16 per cent.), and Brazil (6 per cent.). The contribution of the whole of the British Empire was only about 4 per cent.

### “EMPIRE” CONSUMPTION.

Whereas the Empire only supplied  $7\frac{1}{2}$  millions out of the 228 million lbs. imported into the United Kingdom in 1921, it supplied 41 millions to the 1927 total of 222 million lbs. Further, 7 out of the  $7\frac{1}{2}$  million lbs. of Empire tobacco imported in 1921 were drawn from Nyasaland, India and British North Borneo, whereas in 1927, although these three Empire countries had raised their contribution to 24 million lbs., the imports from Rhodesia and Canada had grown from negligible quantities to 17 million lbs.

Between 1920 and 1924 the consumption of Empire tobacco expanded at a rate of 1,650,000 lbs. a year, and between 1924 and 1927 at a rate of 3,200,000 lbs. a year. British manufacturers withdrew from bond 1,546,000 lbs. of Empire-grown tobacco in 1919, as against 22,793,000 lbs. in 1927.

“We believe,” the Committee continued, “that, given on the side of the producers increased experience in production, strict attention to the quality of the crop and the requirements of the British market, and given on the side of the manufacturers and British public cordial support for Empire products, a still greater rate of increase could be established.”

Already in certain of the newer countries of the Empire, such as Southern Rhodesia and Nyasaland, the cultivation of tobacco is becoming for the time being the mainstay of farming, and, therefore, of settlement.

# The Empire Marketing Board.

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## REPORT ON SECOND YEAR'S PROGRESS.

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In its second annual report (just published by H.M. Stationery Office, 1s. net, with coloured frontispiece), the Empire Marketing Board states that it "has received much evidence that its work has materially strengthened the demand for Empire produce in the United Kingdom and has definitely increased the sale of particular Empire commodities.

"While it would not claim that the increased importation of Empire products during the last few years has been even mainly due to its own efforts, it is of interest to record that upon the basis of the price levels of 1924, the value of imports from Empire countries to the United Kingdom rose from £386,000,000 in 1924 to £420,000,000 in 1927—an increase of nearly 9 per cent. in a period during which the population is estimated to have increased by  $1\frac{1}{4}$  per cent.

"It is of interest also to record, as showing the growing dependence of employment in the United Kingdom upon the development of the overseas parts of the British Empire, that the value of the exports of British produce and manufactures from the United Kingdom to Empire countries, calculated on the same basis, rose from £334,000,000 in 1924 to nearly £380,000,000 in 1927—an increase of 13 per cent."

### RISE IN EXPORTS.

"In 1924 the Empire overseas absorbed 41.7 per cent. of the United Kingdom's export of manufactured goods. In 1927 the percentage had risen to 46.1."

The Board, which is an official body, established by Parliament to further the marketing in the United Kingdom of Empire produce from home and overseas, has worked along three main lines, scientific research, economic investigation



and publicity. Progress in each of these divisions is described in the report, while a full list of the grants made from the fund is given in an appendix.

All "that large part of the Empire Marketing Board's work which lies behind its coloured posters and its press advertisements, the exhibitions, the lectures and the window-dressing competitions which contribute to its publicity campaign" is included under the general head of Research.

### THE PARASITE ZOO.

A salient passage in this section of the report is that dealing with "The Parasite Zoo."

"Insects have been described as the greatest toll-takers of human production. They carry disease amongst men and animals. Wherever man has assembled animals and plants for his purposes of production, they find a target and artificially favourable environment. They destroy, it has been reckoned, a tenth part of all mankind's crops—a preliminary tax of two shillings in the pound upon all the cultivated fruits of the earth."

In last year's report an indication was given of the support which the Empire Marketing Board had promised, to promote the attack upon insect pests and, through parasites, upon the kindred plague of weeds. During the last twelve months their proposals have taken shape. The Imperial Bureau of Entomology has employed a grant from the Empire Marketing Fund to establish in a Buckinghamshire country house a central laboratory, which has come to be known as "The Parasite Zoo." Here are bred parasites that have proved their capacities to destroy certain types of insects, and here experiments are being planned for the testing of parasites of yet unproved capacity. Already, amongst other shipments from this new station, parasites of the blow-fly have been shipped to Australia, New Zealand and the Falkland Islands, and parasites of the earwig to Canada."

### IDEAS ON COMMERCIAL BASIS.

"Last year's report mentioned the grant made to the Ministry of Agriculture for the extension of work already started on a modest scale for the improvement of marketing

methods in England and Wales. This work has been steadily extended during the last twelve months."

"The most convincing way of testing the value of new ideas is," states the report, "of course, to try them out on a commercial basis." Packing stations, equipped to deal with produce on up-to-date lines and keeping full records by which results may be measured, are being established in various parts of the country, and, in certain cases of an experimental nature, the Ministry is giving financial assistance in the early stages.

"Grants have been made or offered out of the Board's grant to the Pershore Co-operative Fruit Market, Ltd., the Cottenham Growers, Ltd., the Norfolk Fruit Growers, Ltd., the British Fruit Packing Company, East Farleigh, and the Gloucester Fruit and Vegetable Co-operative Marketing Society (egg packing station)."

#### MARKETS REGAINED.

"The Board's grant has also been used to assist two new Federations of cheese-making farmers, whose object is to raise and standardise the quality of Cheshire and Cheddar cheese respectively. The first progress report of the Cheshire Cheese Federation makes hopeful reading. It shows that in the first six months of the scheme's operation over 1,500 tons of cheese had been graded, and had regularly commanded a higher price than the best ungraded cheese. Markets in the south of England, which had been lost for years, had been regained by the graded product, and enquiries for it were being received from oversea buyers."

#### FRUIT WASTAGE IN TRANSIT.

"Last year's report mentioned the modest beginning made with the examination of incoming cargoes of Empire fruit. During the year under review this scheme had notably advanced. Botanical officers of the Board are stationed at the ports of London and Liverpool. Observations are taken in the ships' holds. Cases are examined at the port on arrival, and samples of the fruit are followed to the retail shops for further examination there. This scheme has now been applied in turn to the Canadian, Australian and New Zealand fruit shipments."

### EXPORT OF PEDIGREE CATTLE.

“Early this April a quarantine station, built and managed by the Royal Agricultural Society of England in close consultation with the Ministry of Agriculture upon the strength of a grant made from the Empire Marketing Fund, was opened by Mr. Amery. The first consignment of animals, destined for export to Southern Rhodesia, entered the station on the 24th April.

“Those stations are designed to enable the export of pedigree cattle from the United Kingdom to take place at times when export would otherwise be rendered impossible owing to the sporadic outbreaks of foot and mouth disease in the country. Outbreaks of that disease in recent years have prevented oversea breeders from replenishing their flocks and herds from the home country, and have inflicted considerable losses on breeders in Great Britain.

“The new scheme has been welcomed by the breeders of pedigree stock in the United Kingdom, and has excited much interest both at home and overseas.”

### PUBLICITY.

“The Board, at the outset of its work, decided that its main public appeal should be directed less to advertise particular commodities than to interest the public in the Empire and its development, and so create a favourable setting for the activities of those concerned with the sale of individual Empire products. This policy has been confirmed in the light of experience during the last year. The oversea parts of the Empire have been quick to take advantage of this opportunity of using the background of publicity created by the Board.”

### POSTERS.

“The Board has continued and extended the campaign of poster publicity, of which the first steps were recounted in its earlier report. The number of special poster frames has been increased from some 530 in May last to 1,500 in the present month. These frames are now distributed over some 270 towns. They are to be found in almost every town in the United Kingdom with a population of 10,000 or over, and are becoming familiar to every town dweller. Her Majesty the Queen has been much interested in the posters issued by the



Board, and has expressed a wish to see each new set as it is issued.

“In recent months nearly forty members of the British Electrical and Allied Manufacturers’ Association have spontaneously provided free sites for these frames in their works; while the same firms, with many others, whose works did not provide convenient sites for the large frames, have asked for special posters, drawing attention to the produce of particular Empire countries, which they desire to exhibit in their shops whenever work upon contracts from those countries is in progress. The Board is now arranging for the erection and posting of a few examples of their frames on prominent sites in the Empire overseas.”

#### POSTERS IN SCHOOLS.

“Some of these frame sets have been reproduced in smaller size and issued free to schools in the United Kingdom, of which over 17,000 are now on the Board’s list for their receipt. With each set of reproductions so issued, the Board sends out a finely printed leaflet, dealing with the subject which the posters illustrate. It has been fortunate in the writers who have contributed to this series. Thus Mr. John Buchan, M.P., wrote the leaflet on Empire Builders, and Captain David Bone that on the Suez Canal, whilst other contributors have included Mr. Ivor Brown, Mr. Ian Colvin, and Mr. Robert Lynd. Although the Board’s direct work is limited to the United Kingdom, such an insistent demand for these poster reproductions has come from oversea schools that, within the limits of the stocks available, their free issue has been extended to oversea schools whose head teachers make individual application to the Board. The posters are now in the hands of the educational authorities in all five Dominions, in every Colony and throughout the Indian Empire. No more delightful letters are preserved in the Board’s archives than those in which teachers and children alike have testified to the colour and interest which these posters have added to the routine of school life, especially in the great towns of the United Kingdom.”

#### NEWSPAPER ADVERTISEMENT.

“The Board has continued through the greater part of the year to insert advertisements in the principal daily papers of the United Kingdom.”

### EMPIRE KITCHENS.

“The Board has continued its policy of erecting at important exhibitions a pavilion in which spaces are allocated to the home Ministries of Agriculture and to the Dominion and Colonial Governments to display the different sorts of produce in which they are interested. A popular feature of all these exhibitions, other than the British Industries Fair, which is a Trade Fair, was an Empire Kitchen, in which demonstrations were given to crowded audiences of the preparation of dishes of solely Empire constituents.

“The home producer, Australia, New Zealand, South Africa, the Irish Free State, India, Northern Ireland, the West Indies, the East African Dependencies, the Gold Coast and Cyprus have all been represented in the Board’s pavilion at most of the exhibitions. It is pleasant to record that their enterprise has been rewarded by many enquiries from traders and from the public about the produce in which each is interested. It is pleasant also to report that Canada, which has hitherto been unable to take part in other exhibitions than the Imperial Fruit Show, will during the coming year be handsomely represented at all the exhibitions in which the Board proposes to take part.”

### EMPIRE SHOPPING WEEKS AND WINDOW DRESSING COMPETITIONS.

“The Board has continued its policy of assisting Empire shopping weeks in the United Kingdom, when they are duly representative of the district in which they are held. It has arranged special lectures, and lent films of Empire interest. It has given prizes for children’s essay competitions. It has supplied posters and shop window bills. It has lent decorative material and has inserted special advertisements in local newspapers.”

### “BUYING BRITISH” OVERSEAS.

“It may here fittingly be recorded that Empire shopping weeks\* have been held overseas during the year in Jamaica

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\* We are pleased to record also that highly successful Empire shopping weeks have been held in Southern Rhodesia during the present year. — Editor, *R.A.J.*

(28th November to 4th December), in Melbourne (23rd February to 10th April) and throughout Canada (21st to 28th April). While it is outside the Board's scope to organise shopping weeks overseas, it was able to give some small assistance in the shape of a supply of posters and window bills to those three undertakings."

### LECTURES.

"The scheme of lectures mentioned in the Board's first report has now been in operation for a year, during which time 2,613 lectures and addresses have been given under the Board's auspices."

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## Departmental Announcements.

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The following items are published for general information:—

#### **Cattle for Northern Rhodesia and Belgian Congo.—**

The charge for the veterinary inspection at the Victoria Falls of cattle consigned to Northern Rhodesia and the Belgian Congo has been reduced from 2s. 6d. per head to 1s. per head. This reduction, which came into force on 1st October, 1928, does not affect any incidental charges which may be levied *en route*.

**"Rhodian" Cigarettes.**—We are informed that Messrs. Lambert & Butler are shortly bringing out tins of 100 "Rhodian" cigarettes, in each of which is packed a cigarette holder of appropriate size. It is stated that these holders are of exceptionally good quality and similar in value to those sold for 1s. 6d. or more in retail shops.

**Tobacco Advances.**—Frequent enquiries have recently been made to the Agricultural Department as to the advances which will be made by or through the Government on the 1928-29 tobacco crop. It was stated by Mr. Downie



in the House of Assembly that advances would not amount to more than 25 per cent. of what was being given this year.

The Government is considering a scheme whereby advances to small growers, and more particularly those entirely dependent upon their tobacco crop for everything, will not be appreciably restricted.

In this connection efforts are being made to provide that advances on the basis adopted in the case of the crop just reaped be made available to individual producers on normal average crops of 20 acres, that is, the Government hope to arrange that the 75 per cent. reduction will not apply to the first 20 acres. Full consideration will be given to the whole subject immediately the elections are over.

In 1927 the total number of growers was 902, and the number growing 25 acres or less 315. The average for the 902 growers was 51 acres.

**Sheep-Breeding Stations.**—The Government has decided to establish a sheep-breeding station on the Matopo Government farm, and also a similar station on the Rhodes Estate farm, Tinaru, in the Makoni district.

It is the opinion that the sheep industry will be better served by the establishment of Government sheep-breeding stations, from which it is hoped acclimatised sheep would in due course be available for farmers at reasonable prices, than by the present arrangement of having sheep experiments on private farms.

Loans up to £150 will still be granted whilst funds are available to approved applicants for the purchase of sheep.

**Seed Maize.**—Tobacco growers and others who have not previously grown maize are warned to place their orders for seed maize at an early date, and not leave this important matter until supplies of good seed become scarce and prices rise.

Farmers desiring to supply good maize for seed at reasonable prices should forward samples and prices to the Department, and intending purchasers will be placed in touch with suppliers.

Particulars and enquiries should be addressed to the Chief Agriculturist, Department of Agriculture, Salisbury.

## Movements of New Settlers.

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The following new settlers arrived in the Colony during the month of September, 1928:—

C. L. Cousing.—Arrived from the Union on 6th August and proceeded to Mr. W. J. Fletcher, Nyabira, for a period of training.

Mr. and Mrs. H. Malir and Daughters.—Arrived from India on 6th August and proceeded to Mr. Van Breda, The Falls, Headlands, for a period of training.

T. C. V. Durrell.—Arrived from Great Britain on 7th August and joined Mr. E. Studdert-Holmes, Msoneddi.

J. Hamir.—Arrived from Great Britain on 8th August and proceeded to Mr. E. S. White, Glendale, for a period of training.

H. T. Pratt.—Arrived from Great Britain on 8th August and proceeded to Mrs. J. F. Templeton, Dunphaile, Banket, for a period of training.

R. B. Halliwell.—Arrived from Great Britain on 8th August on tour of inspection.

A. Maclean.—Arrived from Great Britain on 8th August and proceeded to Mr. G. Syfret, Springs, Salisbury.

Mr. and Mrs. Fairbairn and Son.—Arrived from Great Britain on 13th August and are staying in Salisbury.

J. E. Goodwin.—Arrived from the Union on 20th August and is with Mr. J. L. Johnston, on Bannockburn, Salisbury.

P. A. Kelly.—Arrived from Great Britain on 24th August and proceeded to the Government Farm, Gwebi, for a period of training.

A. G. Thomson.—Arrived from the Union on tour of inspection.

Mr. and Mrs. Baikie and Son.—Arrived from Great Britain on 27th August and are staying with friends in Bulawayo.

V. P. Somers.—Arrived from the Union on 28th August and is staying in Salisbury.

H. Frost.—Arrived from the Union on 28th August and is with Mr. G. Syfret, Springs, Salisbury.

Mr. and Mrs. W. J. Seymour and Sons.—Arrived from Great Britain on 31st August and is with Mr. H. Le T. Boyd-Moss, Somerfield, Penhalonga.

Mr. and Mrs. H. B. Wiggins.—Arrived from Great Britain on 31st August and proceeded to Mrs. Munch, Mona, Rusape, for a period of training.

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## Government Farm, Matopos.

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### FOR SALE.

Pedigree Large White Pigs, Young Boars and Gilt, Prices on enquiry.—Apply to Manager, Government Farm, Matopos, Private Bag, Bulawayo.



# Export of Cattle from Southern Rhodesia, 1928.

Month	Union		Eng-land.	Congo		N. Rho-nesia	Portuguese East Africa.		Total
	Slaughter	I. C. S. for overseas	Slaugh-ter	Slaughter	Breeding	Slaughter	Trek	Breeding	
January	55	...	...	1,370	39	...	108	...	1,572
February	190	...	...	2,287	453	...	111	...	3,041
March	562	2,746	...	4,257	13	192	39	...	7,809
April	957	4,927	...	3,468	12	193	84	...	8,641
May	1,522	5,864	...	4,545	11	...	36	...	11,983
June	2,278	6,000	...	1,505	949	...	177	...	10,914
July	1,370	2,065	140	1,458	1,682	63	104	33	6,863
August	1,400	4,949	...	1,372	2,352	...	...	32	10,105
September	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...

J. M. SINCLAIR,

Chief Veterinary Surgeon.

# Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	October.	Nov.
Ayrshire—Sipolilo	Various farms	G. H. Cautherley	1928	1928
Banket Junction	Banket Hotel	A. M. Hutchinson	13	10
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	5	2
Bindura	Bindura Farmers' Hall	W. E. Fricker	25	29
Bromley	Farmers' Hall, Bromley Siding	W. E. Fricker	12	9
Bubi	Queen's Mine	E. Somerville-Collie	3	7
Chakari	Eastern Sect. (Oct.), Balwearie (Nov.)	C. H. Olsen	9	13
Daisyfield	Daisyfield (Oct.), Somabula (Nov.)	L. T. Tracey	17	21
Darwendale—Trelawney	Various farms	L. E. Edwards	20	10
Eastern Districts	Farmers' Hall, Chidza	C. S. G. Budge	24	28
Enkeldoorn	Enkeldoorn	W. E. Richards	13	10
Enterprise	Farmers' Hall	C. N. Ludlowe	2	6
Essexvale	Essexvale	James Watson	2	6
Felixburg—Gutu	Various farms	Col. D. Judson	21	18
Figtree Branch, R.L. and F.A.	Figtree Hotel	A. J. Bradshaw	13	10
Gadzema	Gadzema	The Secretary	2	6
Gatooma	Speck's Hotel	M. G. Leahy	12	9
Gatooma (Golden Valley Branch)	Golden Valley Hotel	B. L. Henderson	20	17
Gazaland (South Melsetter)	Chippinga Hotel	C. A. K. Beaton	13	10
Greystone	Quarrie Farm	Mrs. C. N. Reading	1	5
Gwanda	Timber Farm (Mr. N. J. B. Nilson)	P. J. van der Walt	...	10
Hartley	Old Schoolroom, Hartley	N. B. Nilson	No fixed	dates
Headlands	Headlands	E. Etheredge	27	24
Hunter's Road	Hunter's Road	J. A. Eve	...	...
Inyaza South	Farm Lancaster	R. W. Twilley	27	24
Inyazura	Inyazura	J. Campbell	11	8
Lalapansi	Lalapansi	W. P. Frudd	5	...
Lomagundi	Sinoia	Edmund Chapman	13	10
Lomagundi West	Various farms	F. W. Robertson	12	...
Macheke	Farmers' Hall, Macheke	A. A. Bisset	14	11
Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	The Secretary	...	...
Makwiro	Makwiro	T. R. Colam	6	3
		F. H. Howard	19	16

Marandellas	-	Marandellas Farmers' Hall	-	E. Cruikshank	-	5	2
Marandellas, Southern	-	Various farms	-	D. L. Gale	-	3	7
Mashonaland	-	Mashonaland Farmers' Hall, Salisbury	-	C. Lamb	-	12	9
Matabeleland Landowners', Farmers and Cotton Growers' Association	-	Library Buildings, Bulawayo	-	W. A. Carnegie	-	11	8
Matopo Branch, R.L. and F.A.	-	Farmers' Hall, Malundi	-	W. Mirtle	-	20	17
Mazoe (Concession)	-	Concession Hotel	-	Frank Allen	-	12	9
Mazoe (Glendale)	-	Farmers' Hall, Glendale	-	E. McNulty	-	10	14
Melsetter	-	Court House, Melsetter	-	Dr. Rose	-	11	8
Midlands Farmers and Stockowners	-	Royal Hotel, Gwelo	-	T. R. van Rooyen	-	10	14
Ngezi-Umniati	-	Harvieston, Enkeldoorn	-	Miss Harvie	-	27	24
North Umniati	-	-	-	J. F. Eagar	-	Not	received
Norton and Lydiat District	-	Norton	-	R. D. Palmer	-	5	2
Nyamandhlovu	-	Nyamandhlovu	-	R. D. McLean	-	12	...
Odzi District Farmers	-	Odzi Hotel	-	F. H. Burnett	-	6	3
Poorte Valley	-	Various places	-	A. D. Wilson	-	20	17
Que Que	-	Offices of the Que Que Sanitary Board	-	J. Hogg	-	20	17
Rusape Farmers' Association	-	Rusape	-	R. Munch	-	6	3
Salisbury South	-	Various farms	-	P. Linton	-	31	28
Selukwe	-	The Hotel, Selukwe	-	W. T. Simpson	-	...	...
Shamva	-	Shamva Hotel	-	W. Stanley-Stollard	-	18	15
Two Rivers Farming Association	-	Various farms	-	W. L. Parsons	-	20	17
Umboe (Branch of Lomagundi F.A.)	-	Various farms	-	A. Greenway	-	...	10
Umvukwe Farmers' and Tobacco Growers' Association	-	Various ranches	-	E. Wrightson	-	13	10
Umtali	-	Drill Hall, Umtali	-	A. Howat	-	4	1
Umvuma and District	-	Umvuma	-	H. B. Colling	-	Not	received
Victoria	-	Victoria	-	G. E. Lamb	-	6	3
Wankie District	-	-	-	W. Brownlee Cumming	-	Not	received
Western	-	Plumtree Hotel	-	The Secretary	-	13	10
Willoughbys	-	Willoughbys	-	A. E. Roberts	-	Not	received



## Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
De Grendel Rita	Friesland	3,987.00	...	120	C. A. Blackwell, Norton
Home Park	do	7,001.00	...	240	R. G. Fox, Umtali
Mary III.					
Rathwick	do	4,032.00	...	180	do do
Princess IV.					
Home Park	do	5,924.75	...	180	do do
Elske V.					
Rathwick	do	5,735.00	...	180	do do
Maud III.					
Home Park	do	6,133.00	...	180	do do
Alma V.					
Rathwick	do	6,462.00	...	180	do do
Mermaid					
Umtali Nereid...	do	3,698.25	...	150	do do
Umtali Queen ...	do	3,441.75	...	120	do do
Home Park	do	4,374.00	...	120	do do
Agnes					
Umtali Mary ...	do	2,805.50	...	120	do do
Princess ...	do	2,642.00	...	90	A. T. Holland, Chatsworth
Mary ...	do	1,941.00	...	60	do do
Palm Tree Milly	do	9,510.00	...	459	M. Inge, Sinoia
Palm Tree Neeltje	do	7,521.00	...	329	do do
Palm Tree Ethel	do	5,478.00	...	227	do do
Langton Nessie	do	2,397.00	74.03	126	do do
Langton June...	do	2,118.00	63.87	101	do do
Langton Daisy	do	1,019.00	36.10	53	do do
Joyce ...	Grade	1,282.50	...	30	W. F. H. Scutt, Norton
	Friesland				
Bertha ...	do	953.00	...	30	do do
Noreen ...	do	959.50	...	30	do do
Sybil ...	do	864.50	...	30	do do
Dorothy ...	do	675.50	...	30	do do
Beryl ...	do	786.00	...	30	do do
De Grendel	Friesland	8,164.50	246.15	208	Gwebi Experiment Farm
de Hoop					
De Grendel Roza	do	5,118.25	130.95	200	do do
De Grendel	do	7,942.25	207.12	192	do do
Froukje					
De Grendel	do	6,717.75	187.83	154	do do
Selma					
De Grendel Laura	do	3,563.25	102.35	119	do do
Flora of Elsmore	do	6,013.75	208.11	240	do do
Wit Fancy ...	do	5,917.00	174.46	240	do do
Mimosa Pel	do	5,343.00	181.66	216	do do
Stienser					

## RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.	
Mimosa	Friesland	5,655.25	173.69	161	Gwebi Experiment Farm	
Clara II.						
Mimosa Clara X.	do	4,388.50	127.23	63	do	do
Melrose Corrie...	do	4,384.00	107.82	101	do	do
Melrose Roosje	do	1,584.75	40.88	37	do	do
Melrose	do	223.00	...	6	do	do
Maandag						
Janie ...	Grade	8,129.00	258.89	315	do	do
	Friesland					
Fanny ...	do	9,306.75	289.06	276	do	do
Lucy ...	do	5,668.50	159.20	216	do	do
Katie ...	do	5,819.25	180.35	196	do	do
Kleinbloem ...	do	5,587.50	166.39	183	do	do
Gwebi	do	3,465.00	109.65	184	do	do
Waterbloem						
Gwebi Janie ...	do	1,915.75	78.23	105	do	do
Gwebi Laura ...	do	290.50	...	7	do	o
Gwebi Elsie ...	do	964.75	25.85	18	do	do
Hannah ...	do	8,162.25	250.59	184	do	do
Gladys ...	do	2,751.75	81.02	56	do	do

# Farming Calendar.

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## October.

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### BEE-KEEPING.

Bush bloom is now on, the queens consequently are laying vigorously, therefore give space and ventilation. In good districts, where stocks are strong, nectar may be coming in freely, and to prevent swarming it may be necessary to remove a crate of honey. By using the carbolic cloth, the operation is easily and quickly accomplished. At this season, whenever a crate of honey is removed, a properly fitted empty crate must take its place, otherwise the bees will swarm. Keep the apiary clear of weeds, and all hives well shaded. Feed any weak stocks.

### CITRUS FRUITS.

Citrus trees should not be permitted to suffer for want of water if a good setting of fruit is desired. Continue irrigation at fairly frequent intervals, especially if it is windy. Cultivation must follow each irrigation when the soil is fit to work, otherwise a large amount of moisture will be lost by evaporation. The packing of late fruit for export should be completed early in the month or before the rains commence. If rains intervene, the carrying properties will be affected and the fruit will probably break down in transit. Suppress all stem growths or water shoots as they appear. Young trees planted last season may with advantage have the stems whitewashed or washed with Bordeaux mixture paste; this will prevent undue sun-scalding of the unprotected stems. Plant cover crops with the first good rains.

### CROPS.

If not already attended to, overhaul all farming implements and replace worn parts to ensure efficiency.

Shell ground-nuts required for the season's planting.

Ploughing of old lands should, at latest, be finished this month.

If seed potatoes will not keep in good condition until next month, they may be planted now, but later planting is better.

Edible canna may be planted this month before rain falls. Also velvet beans, dolichos beans and sunn hemp towards the end of the month for green manuring.

Harvest winter cereals and plough under the stubbles as soon as possible after harvest.

When rains have fallen, use every effort to improve the tilth of the lands which will be the first to be planted.

On cloddy lands already ploughed, seize the opportunity to break down the clods by disc and drag harrowing as showers of rain fall. A spiked roller is very useful for this work.

A good tilth means good planting, and a good stand of maize; therefore, do everything possible by cross ploughing, disc and drag harrowing to bring the soil into good condition for seeding.



When necessary, keep the harrows going to check early weed growth. Clean lands at this time of year are an insurance against cutworm and other insect pests.

If weather conditions permit, plant a trap crop of maize to attract the stalk borer.

New land to be ploughed and intended for planting this season should be cleared of heavy grass or weeds by burning or cutting to ensure good work being done by the ploughs.

Seasonal showers of rain are liable to spoil bricks unburned. See that bricks which have been made are protected from rain.

Clean out guttering and down-spouts of house and farm buildings.

Press on with development work so as to have this completed before rains break.

#### DAIRYING.

During the month of October and until such time as the rains have commenced and green grazing is available, dairy stock require to be almost entirely stall fed. Cows in milk and cows due to calve should be liberally fed on succulents and concentrates in order that they may commence the dairying season in good condition, and make full use of the early grazing for milk production. Dairy cows that are underfed at this time of the year invariably produce milk of poor quality, and usually throw weedy undersized calves; furthermore, they do not pick up in condition until comparatively late in the season.

During October, the cow's ration should consist of succulents such as silage or green feed, etc., legume hay of good quality and a liberal allowance of concentrates; a pound or so of a feed such as ground-nut cake is invaluable for dairy stock at this time of the year.

Weather conditions are generally fairly warm during the month of October, and every precaution should be taken to keep the cream, which is used for butter-making or which is sent to the creamery, as cool as possible. The can or bucket containing the cream should be placed in a basin of water or concrete trough, in the dairy, and exposed to a draught; a piece of kaffir blanket, which dips into the water, should be wrapped around the can or bucket containing the cream. Churning of cream for butter-making is best carried out early in the morning—before sunrise if possible; the coolest water obtainable should be used for washing the butter whilst in the granular stage.

At this season of the year cheese-makers may find that the milk is deficient in butter fat; this is generally the result of under-feeding or unsuitable feeding. Cheese made from milk of low fat content is invariably dry and hard, defects that are accentuated by over cooking the curd or by cooking at too high a temperature. The curd should be firmed in the whey at a temperature not higher than 98° F. to 100° F.

#### DECIDUOUS FRUITS.

Keep all trees well watered until the rains commence; cultivate after each watering to prevent evaporation of added moisture. Rub off all undesirable shoots, such as those arising on the main stem near the ground; also those shoots having a tendency to crowd each other. Two or more shoots should not be allowed to develop from the same spot on any part of the tree. Rub off the undesirable ones soon after they appear. The fruit of early peach trees should be thinned out if a heavy crop has set; this thinning will result in a crop of large-sized fruit. All fruit should be thinned out if necessary.

#### ENTOMOLOGICAL.

Maize.—Where circumstances permit early growth of maize, crops planted late in October are liable to suffer in December from stalk-borer, especially if only a few acres are involved. If maize can be planted early in October, the plants are usually large enough by December to outgrow

serious damage. Maize beetle is now in its pupal stage. Thorough working and smashing up of the soil at this time will destroy great numbers.

**Tobacco.**—See notes for last month, together with article in the "Rhodesia Agricultural Journal" for October, 1926, on "Baiting of Tobacco Seed Beds with Cyanogas Calcium Cyanide." The lands must be kept free from all weeds which caterpillars may feed on, and it is well not to have maize lands, tomato and Cape gooseberries near the lands; a clearing of some depth is advisable, which must be regularly weeded. If poisoned bait is put down, it has been found that a covering of sacking or leaves will help to retain moisture and thus give further attraction, especially at this time of the year. In order to lessen the heavy infestation of caterpillars and other insect pests in the seed beds, coverings of hessian or cheese cloth should be kept over beds, especially at night; cutworm moths are nocturnal in habit, so that the coverings of the beds need to be moth-proof at night. Notwithstanding precautions in the covering of the beds, insects will enter, and after the emergence of the seedlings a weekly spraying should be carried out. Lead arsenate at the rate of  $1\frac{1}{2}$  ozs. (powder) or 3 ozs. (paste) in a 4-gallon petrol tin can be sprayed on the plants once a week to keep insect pests in check. Lead arsenate can be safely used with Bordeaux mixture, the mixture not reacting upon one another. The two combined sprays act as a preventative and deterrent to insect and fungoid troubles.

**Cotton.**—Thorough cultivation and keeping down of weeds should be resorted to in order to lessen the infestation of over-wintering pupæ, by exposure to the sun, and birds.

**Potato.**—Avoid introducing root gallworm and potato diseases to valuable land under irrigation or to the home garden with seed potatoes. Growing plants in October may be defoliated by caterpillars, or the tops severely injured by the potato tuber moth. Spray with arsenate of lead (powder), 1 lb. to 30 gallons of water; or (paste), 1 lb. to 16 gallons of water.

**Cabbage, Turnip, etc.,** are apt to suffer severely from diamond back moth and webworm. Dust regularly with Paris green, 1 lb.; fresh water-slaked lime, 20 lbs. For cabbage aphis, water liberally, and wash plants regularly with a forceful stream of water from a hose or spray pump.

**Beans and Peas** are little attacked by insects at this time of year. If aphis (green fly) is troublesome, the plants may be sprayed with soap wash or tobacco wash. Leaf-eating beetles are best destroyed by hand.

**Cucumbers, Marrows, etc.,** may be attacked by leaf-eating beetles, which quickly destroy the young plants. The young plants may be protected by gauze covers. Once vigorous growth has started, the damage is negligible.

**Citrus.**—All out-of-season fruit should be removed by this time. Destroy all fruit "struck" by the false codling moth. Aphis may be controlled by very careful spraying with the combined "Lime-Sulphur-Nicotine" spray (for details see "Rhodesia Agricultural Journal," Sept., 1926, page 871), while the yellow thrip may also be kept in check by this spray. Avoid using miscible oils for citrus spraying. A careful search should be made for the American bollworm ("Heliothis obsoleta"), and the Chief Entomologist should be immediately informed should this pest be found.

**Deciduous Fruit Trees,** including grape vines, are liable to attack by chafer beetles. Heavy spraying with lead arsenate (paste), 1 lb. to 10 gallons of water, or (powder), 1 lb. to 20 gallons, appears to afford considerable protection, but the leaves need thoroughly coating.

**Fig.**—Fruit infested with fig weevil should be collected regularly and destroyed.

#### FLOWER GARDEN.

All flower seeds, annual and perennial, may be sown as in September. A word or two on open seed beds may not be out of place here. These beds



should be prepared in a sheltered position, and the soil should be well and deeply dug. This is most essential, as in this state the soil when once watered is more easily kept moist, and is not so liable to cake. The top dressing should be free from all undecayed vegetable matter, and when sown, the seeds should be covered with a thin dressing of fine light soil, over which a thin covering of grass may be placed to check evaporation. Transplanting from boxes or beds should be done on a dull day or towards evening; the plants should be well watered before being removed, and the roots disturbed as little as possible, care being taken that the latter have their full depth and spread when planting.

#### VEGETABLE GARDEN.

As in September, nearly all vegetable seeds may be sown. Early potatoes should be earthed up when reaching the height of about eight inches. In planting a small amount of marrow, melon, cucumber, and pumpkin, the writer has found it economical to sow the seed one in a tin and transplant when about four inches high in hills. A few cucumbers planted in this manner yielded nearly 400 a week for about two months. Sweet corn and maize may also be sown this month.

#### FORESTRY.

Prick out into tins or trays any seedlings that are ready. Seedlings in open beds may have their tap roots cut so as to develop fibrous lateral roots. Sowings of eucalyptus seed should be taken in hand. If conditions are favourable, cross plough and harrow land broken up in early autumn.

#### POULTRY.

October is usually a hot month, and poultry keepers should therefore see that their birds have shade during the hottest part of the day. At the same time they should have plenty of air. One often sees birds during hot weather sitting under dense bushes, which is almost worse than no shade at all.

All houses should be examined and, if necessary, repaired. It is advisable to repeat the caution that birds must have dry quarters.

Many poultry keepers do not realise the vital necessity of giving their birds especially the young stock, plenty of succulent green food during the hot weather. It should be cut up and placed in boxes or hoppers about 7.30 a.m. and 5 p.m., and, if very hot, also at noon; it should never be placed in the sun. As much as the birds will eat should be supplied. Lack of it, especially during hot weather, causes a reduced output of eggs, smaller eggs and light-coloured yolks; further, a disease known as "nutritional disease" is likely to affect the birds and cause deaths. The symptoms are much like those of eye roup, without the well-known offensive smell of roup. It is due to the fact that vitamine A, which is present in large amounts in all succulent green foods, and which is so necessary for nutrition, is lacking. There is no doubt that many chickens and fowls die each year from this cause.

Ducks.—These during the hot weather require even more shade than do fowls; they cannot stand the direct rays of the sun nor sultry heat. The houses should always have dry floors, and should be overhauled before the rains commence. Ducks sleeping on damp floors often contract rheumatism and cramp. Part of the floor of the duck house should be raised a few inches, thus ensuring a dry bed.

As many ducklings should be hatched as possible now, provided, of course, there is the prospect of a sale for them at ten weeks old. They thrive best in the wet weather.

Turkeys.—Stop hatching until after the wet season is over. To rear turkeys in the wet weather entails a good deal of time, labour, expense and often losses. Once a young turkey chick gets wet, it will probably die; at any rate it will never be the same bird it would have been had it not got wet. Give the older turkeys all the range possible; the further



afield they go, the better grown birds they become, and less is the expense of feeding. See also that their roosting quarters are water-tight before the rains commence.

#### STOCK.

Cattle.—Ranching cattle on granite veld will in many instances be in fairly good condition on account of the early grass in the vleis, etc. On the diorite soils and later veld the cattle owner will still have to watch his weaker cattle carefully. In any case all supplies of hay, ensilage, majordas, etc., should be carefully husbanded in anticipation of possible late rains, but at the same time every effort should be made to prevent cattle becoming weak. Dairymen will need to feed highly both with succulents and green foods. Calves should be weaned and branded, if this has not already been done, and care should be taken that they do not suffer any serious set-back by reason of the want of veld. If calves are not desired in mid-winter, the bulls should be taken out of the herd now until the end of January. Care should be taken to provide a plentiful supply of clean water, and dipping must be regularly attended to.

Sheep.—If spring lambs are expected, one should see that the sheep shed is in order, and that there is a supply of hay, ensilage or mealies for the poorer ewes in the case of late rains. All drinking places should be cleaned out, and care taken that the water supply is sufficient.

#### TOBACCO.

Continue to sow seed beds. Where grass has been put on the seed beds to assist germination of seed a daily inspection should be made, and as soon as the first few plants make their appearance the grass should be raised up a little from the bed in order to prevent the plants growing "spindley." All possible preparation for the coming planting season should be made.

#### VETERINARY.

White scour is prevalent in spring—November and December—but dipping is eradicating this disease. There is still danger from vegetable poisoning, and it will only disappear when there is plenty of good grass on the veld.

#### WEATHER.

This is apt to be a hot, dry month, and rather trying, therefore, to man and beast, and the strong winds which blow at this season add to the general discomfort. Evaporation is, as a consequence, at its greatest at this time of year, and dams and pools lose most from this cause. The prevalence of veld fires at this time of year adds to the anxiety of the stock owner.

The rainy season has occasionally started early in October, but for practical purposes it need not be expected before the end of this month. The days are becoming warmer, and often even hot and oppressive. Clouds gradually collect, at first disappearing at sunset, but later becoming more persistent. Sheet lightning is usually frequent, and showers of gradually increasing severity mark that the rainy season has set in. Steps should be taken in advance to provide for the run-off after such torrential rains, otherwise serious loss may result.

The normal rainfall varies from three-quarters of an inch to an inch in the different portions of the country. The rain usually occurs in the form of thunder-showers, which are not long sustained and are fairly local, but the total rainfall experienced during the month does not vary much over the whole country, with the exception of the eastern border, where the rainfall is usually heavier.

## November.

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### BEE-KEEPING.

Now that the first honey flow is on, be sure the hives stand level, whether working them for extracted or section honey. This is important, saving annoyance when preparing the product for market. Occasionally, where bees have not been thoroughly subdued, they object to the removal of honey; postpone the operation for 24 hours. Where increase of stocks is required, artificial swarms can now be made. Use care in storing honey.

### CITRUS FRUITS.

If no appreciable rain has fallen, irrigation must be resorted to in order to keep the trees in good growth and to prevent any check to fruit development.

This is a good month to plant green crops. Sunn hemp is possibly the best crop to smother weed growth and supply humus-forming material after it is ploughed in.

If not already done, storm drains should be made on the sloping ground to prevent erosion of the surface soil during heavy storms.

Where new plantings are contemplated, the holes should be dug and everything got in readiness for planting if the trees are ready for lifting in the nurseries.

All unthrifty trees could with advantage have an additional amount of fertiliser and manure applied during the month. Keep down all water shoots.

### CROPS.

Take note when the first rains fall, and see what leaks there are, if any, in the farm buildings. Do not neglect to effect such repairs as are necessary.

Early in the month see that the planters are in perfect order, and that they drop the different seeds to be planted evenly and at the right distance. Try them out on the farm road.

Hasten the work of getting the lands for early sown crops into as good a condition for seeding as possible, so that the first and most favourable opportunity for planting may be seized. The young plants make more rapid growth in a good seed-bed. Utilise exceptionally early rains for this purpose rather than for planting.

The holes for check-row planting of maize can continue to be prepared until sufficient rain has fallen to allow of planting.

Velvet beans and dolichos beans for seed or hay may be planted dry if the land is in good order.

With favourable weather, planting of maize, velvet and dolichos beans and cotton will commence about the middle of the month, and will continue as the condition of the land and the rainfall permit.

Main crop potatoes should be planted from now on to January.

Dhal may be planted for seed or green-manuring—if for seed, a frost free situation is necessary.

Kaffir corn for seed may be planted this month.

Green-manure crops requiring a long growing season should be planted.

Destroy, by feeding or burning, early planted trap crop of maize or volunteer plants which have become infested with stalk-borer.



If weeds are beginning to show, keep the harrows going in front of the planters. If weeds are too advanced to be killed by drag harrows and too numerous to be dealt with by hand labour, use the disc harrow or lightly re-plough the land.

If the tilth is good, do not be afraid to harrow the young maize. This will save much labour later on by destroying the weeds while they are small.

#### DAIRYING.

In a normal year veld grazing should be plentiful in November, and the feeding of dairy stock is then very much simplified; veld grass in a green and succulent condition is practically all that is required for animals of less than average production. Heavy milking cows, however, on early pasture, require extra feed in the form of concentrates, while the latter should always be fed to dairy stock which are in poor condition at this time of the year. Young calves should not be turned out to graze with the herd, and in wet weather are best kept in a clean, dry, airy pen. Weaned stock, which have not hitherto had access to green pasture, should be gradually accustomed to the change in diet and may at first be turned out to graze for short periods. Young stock on pasture should also receive a small daily allowance of concentrates.

Farmers supplying cream to the creamery should adjust the cream screw to the separator so that the latter will separate a cream testing 45 to 50 per cent. butter fat. Cream of this consistency will keep better than thinner cream. It should be borne in mind that it is practically impossible to produce first-grade cream if the cattle are milked in a muddy kraal. In the absence of a cow shed, every endeavour should be made to erect a small milking shed in which four or five cows can be tied, milked and fed. A small shed of this kind is also essential to obtain clean milk for cheese-making. Milking in a muddy kraal invariably results in a gassy, bitter cheese being produced.

The shelves of the cheese room should be scrubbed with boiling water and soda, and for the last rinsing a weak solution of formalin may be used. This should prove effective in controlling cheese pests.

#### DECIDUOUS FRUITS.

Continue thinning out fruit on the trees if a very heavy setting has occurred. A small amount of large-sized fruit is preferable to a large crop of small fruit. Thin down the inner growth of new shoots if they have a tendency to crowd each other, and stop all suckers and main stem growths as they appear.

#### ENTOMOLOGICAL.

**Maize.**—Crops planted before the last week in this month are liable to suffer later from stalk borer. At Salisbury, crops planted after 27th November have escaped serious injury, but early December plantings are probably the safest. Volunteer maize is commonly badly infested and should be cut out and removed immediately, otherwise the borers tend to spread to surrounding plants. If rain has fallen sufficiently early, lands may be baited at the end of the month against surface beetles, snout beetles and other pests which tend to reduce the primary stand of plants. The formula is arsenite of soda 1 lb., cheapest sugar 8 lbs., or molasses 1 gallon, water 10 gallons. Dip chopped Napier fodder or other green stuff and distribute broadcast. The poison may be sprayed over volunteer maize and weeds on land with good effect. Cutworms do not usually appear in numbers until December, except in low-lying land. Succulent green stuff soaked in a 2 per cent. solution of sodium fluoride is the most recent formula for poisoned bait, but destruction of these pests is difficult. Keep the land clear of weeds as a preventive measure. If the young plants are attacked by the black maize beetle (*heteronychus*), the only remedy is to destroy by hand. Good, clean farming will control these pests to a large extent.



**Tobacco.**—This crop is subject to many pests in its early stages, although attacked by a few after vigorous growth has started. Keep cheese cloth covers on seed beds at night to exclude pests, and spray regularly with arsenate of lead (powder) 1 lb. in 30 gallons of water to protect against leaf-eating insects, etc. Lands may be baited against surface beetles with maize bran moistened with arsenate of soda 1 lb. in 30 gallons of water. Distribute in balls about the size of a golf ball and cover over with branches or anything to protect from sun. Place one ball to each ten plants and moisten again when dry.

**Potato.**—The first brood of leaf-eating ladybirds appear in November. Spray with arsenate of lead (powder) 1 lb. in 30 gallons of water. Spraying is also useful against the black blister beetles, which sometimes attack the crop on sandy soils. Keep the soil of irrigated crops well hilled and in friable condition as a precaution against tuber moth laying eggs on the tubers.

**Kitchen Garden.**—Plants of the cabbage family are liable to attack by diamond-back moth and other leaf-eating insects. When considered desirable, young plants may be dusted lightly with arsenate of lead (powder). Cabbage aphids may be kept in check by liberal watering and frequent washing with a forceful stream of water from a hose pipe or spray pump. Drenching the plants regularly with cold water is also held to be a good remedy for the diamond-back moth mentioned above.

**Deciduous Fruits.**—Young trees may need spraying with arsenate of lead (powder) 1 lb. in 20 gallons of water as a protection against chafer beetles, whose attack may check the growth very seriously. Choice varieties of early peaches may be netted to protect them from fruit-piercing moths.

**When in doubt as to the identity of any pest or the method of dealing with it, apply promptly to the Chief Entomologist, Salisbury, bringing or sending specimens of the insects concerned. Note, however, that it is sometimes feasible to prevent injury from pests for which no practical remedy is known. Farmers should therefore endeavour to obtain some knowledge of the pests of the crops they are growing through the articles published in this Journal.**

#### FLOWER GARDEN.

All seeds may now be planted. Annuals for January flowering should be sown, amongst which the following will be found to do excellently in this country:—Balsam, Calliopsis, Centurias, Chrysanthemum, Dianthus, Escholtzia, Marigold, Mignonette, Gallardia, Phlox, Poppy, Nasturtium, Nigella, Verbena and Zinnia. These are all hardy, and may be sown in the open either in beds or in the position desired for flowering. Advantage should be taken of each shower of rain during this month to keep the soil well worked and loose.

#### VEGETABLE GARDEN.

All vegetable seeds may be sown during this month. Tomatoes and early peas and beans should be staked. The soil should be kept loose and free from weeds, which now get troublesome. Sow pumpkin, mealies, peas and potatoes.

#### FORESTRY.

Prick out into tins or trays any seedlings that are ready. Seedlings in open beds may have their tap roots cut so as to develop fibrous lateral roots. Sowings of eucalyptus seed for late planting should be made. Cross plough and harrow land to be planted. If fresh seed is obtainable, sow seed of cedrela toona.

#### POULTRY.

Some birds will now be commencing to moult. This will cause a decrease in the number of eggs laid. The poultry keeper, therefore, should see that his birds come through the moult as quickly as possible. Some birds will lay and moult simultaneously, but these are the strongest, most vigorous and the best layers; the majority do not. The process of moulting is a

natural one, but it is a severe strain on the system. Fowls that are not too fat, and can stand extra feed at the commencement of the moult, come through it best. More green and animal food should be given, and the utmost care taken that they are not exposed to cold or wet, otherwise they will not only take longer to moult, but go off in condition. A little linseed stewed, or linseed meal, or ground nut meal and milk should also be given. There will next month be a demand for table birds, and such as the poultry keeper intends to sell should be selected. In making this selection, it is no use choosing old or scraggy birds, for it is hopeless to attempt to fatten these, or make them good table birds. Do not coop them up till a fortnight or so before they are to be sold; give them free range and feed them well, with at least one feed of soft food mixed with milk once a day. Turkeys destined for the Christmas market should have free range, but also a feed of soft food once a day, and a good feed of mealies in the evening.

#### STOCK.

Cattle.—Normally rains should have fallen and the veld should be plentiful now. Beyond careful dipping, ranchers should not have much worry. If the season is bad, the poorer cattle should be drafted out and given a little hay, ensilage or mealies daily. Dairymen will not require to feed much succulent food, and usually the more expensive protein foods may be considerably curtailed at this time, but good sweet hay and mealies will be found to be very beneficial to milch cows, even if the veld is very plentiful. Clean dry sleeping places for both cows and calves will pay handsomely for any extra trouble involved. Young calves do not need to walk far, and in wet weather are much best in a clean dry pen. Watch for ticks.

Sheep.—Keep the sheep on high dry land. Be careful to keep the ticks down. Be sure the kraal or sheep shed is dry and clean, and that there is shelter from the rain for young lambs.

#### TOBACCO.

Continue to sow seed beds, watering, etc. When early beds become overgrown and hard, pull out, dig up and re-sow. Begin transplanting with the first good rains, and continue as fast as the rains and planters will allow, until the crop is set out.

Be careful to fill in the misses from previous transplanting before starting on new fields; use the stoutest and best plants for filling in, and try to get the tobacco from any one field to grow and come to maturity as near at the same time as possible. Discontinue filling in when the field has been planted for several weeks, and has made a good start to grow, as the later filled in plants will be choked out by the earlier ones, and will not come to maturity. Cultivate fields as soon as plants are established, to keep down weeds.

#### VETERINARY.

Early heavy rains might bring on horse-sickness before its usual time, but as a rule it need not be feared till the first rains are over in December.

#### WEATHER.

The rains should be commencing, if not already begun; occasionally they have delayed until December, and even later, before setting in properly. Between spells of wet weather lasting several days, fine dry periods occur, at first clear, but later cloudy and thundery, gradually gathering to burst in thunderstorms. The mornings are generally fine, and rain falls chiefly in the afternoon or evening. Heavy downpours are to be expected, and should be provided against beforehand by means of ditches and embankments, and by clearing water ways and furrows.

In a normal season the rainfall varies from two-and-a-half to three inches in Matabeleland, and from three-and-a-half to four inches in Mashonaland generally, with the exception of the eastern border, where it amounts to five inches.

Between the rain periods and prior to the commencement of the rains, severe heat is likely to be experienced.



## Government Notices.

Government Notice No. 588.]

[7th September, 1928.

### GAME LAW CONSOLIDATION ORDINANCE, 1906.

IT is hereby notified that His Excellency the Governor-in-Council has been pleased, in terms of section 4, sub-section (2) of the "Game Law Consolidation Ordinance, 1906," and section 4, sub-section (7) of the same Ordinance, as amended by the "Game Law Consolidation Ordinance, 1906, Amending Act, 1926," to declare that—

1. The operations of sections 9, 10 and 11 of the "Game Law Consolidation Ordinance, 1906," are hereby suspended until further notice within the area in the Lomagundi district defined hereunder:—

#### Description of Area.

An area around Miami in the Lomagundi district bounded by a line drawn from the point where the line of latitude  $16^{\circ} 30'$  south cuts the Angwa River; along this line due west to the boundary of Pendennis Farm; thence southward along the boundary of this farm to its southernmost beacon; thence in a direct line to Chiropozi Hill; thence in a direct line to the headwaters of the Katsanga River; thence down the Katsanga River to its junction with the Naodza River; thence down the Naodza River to the boundary of the Urungwe Native Reserve; thence following the eastern boundary of that reserve to Chisumba Hill; thence in a direct line eastwards to the headwaters of the Chitange River; thence down that river to its junction with the Miami River; thence down the Miami River to its junction with the Angwa River; thence down the Angwa River to the starting point.

2. The destruction of all classes of game, other than birds, by such persons as may be approved by the Minister of Agriculture and Lands, is authorised in the following portions of the Lomagundi, Sebungwe and Gwelo districts:—

#### Description of Areas.

(a) An area in the south-west part of the Lomagundi district bounded by a line drawn from the junction of the Tengwe and Sanyati Rivers; up the Tengwe River to the boundary of the Urungwe Native Reserve; thence southward along the boundary of that reserve to Chiniri Hill; thence in a direct line towards Ziraswa Hill to the Piriwiri River; thence up that river to the boundary of Kinyaga Farm; thence southward along the western boundaries of the farms Kinyaga, Mwemba, Mrindagoma, Kajalitzira, Buffalo Haven, Tsununui, Mvaami, Stockdale, Nemo and Rambo Estates to the Wasenje River; thence down that river to the Umfuli River; thence down the Umfuli River to its junction with the Sanyati River; thence down the Sanyati River to the starting point.

(b) An area in the south-eastern part of the Sebungwe district and the northern part of the Gwelo district bounded by a line drawn from the junction of the Mtanke and Umniati Rivers, up the Mtanke River to the edge of the Mafungabusi plateau; thence southward, following the edge of the plateau, to the hill known as Sidoma near the Sikombella River; thence in a direct line south to the Sikombella River; thence down that river to its junction with the Ngondoma; thence in a direct line east to the Umniati River; thence down the Umniati River to the starting point.



Government Notice No. 329.] \*

[18th May, 1928.

## TSETSE FLY: HARTLEY DISTRICT.

IT is hereby notified that His Excellency the Governor-in-Council has been pleased, in terms of section 4, sub-section (2) of the "Game Law Consolidation Ordinance, 1906," and section 4, sub-section (7) of the same Ordinance, as amended by the "Game Law Consolidation Ordinance, 1906, Amending Act, 1926," to cancel the following Government Notices, namely, No. 201 of 1913, No. 330 of 1914, No. 149 of 1927 and No. 182 of 1927, the last named only in so far as it relates to the Hartley district, and to declare that—

1. The operations of sections 9, 10 and 12 of the "Game Law Consolidation Ordinance, 1906," are hereby suspended until further notice within the following area in the Hartley district:—

## Description of Area.

From the railway bridge over the Umfuli River, down that river to the more eastern of the Government game fences; thence along that fence to the Mzoe River; thence westward along the connecting fence to the western game fence; thence southward along that fence to the Umniati River; thence up the Umniati River to its junction with the Umsweswe River and up that river to the railway line; thence along the railway line to the starting point.

2. The destruction of all classes of game, other than birds, by such persons as may be approved by the Minister of Agriculture and Lands, is authorised in the following portions of the Hartley district:—

## Description of Areas.

(1) The area enclosed by Government game fences and the Umfuli River.

(2) The portion of the district on the west side of the fenced area bounded by the Umfuli and Umniati Rivers and the more western of the Government game fences.

With reference to the area described under 2 (2), it is notified that free licences to sell meat will be issued to approved persons on condition that no "fresh" meat is brought east of the Government fenced zone.

Government Notice No. 597.]

[7th September, 1928.

## IMPORTATION OF COTTON AND COTTON SEED.

IT is hereby notified that His Excellency the Governor-in-Council, under and by virtue of the powers conferred by the "Importation of Plants Regulation Ordinance, 1904," has been pleased to cancel Government Notices Nos. 86 of 1923 and 289 of 1921, and to declare that the following regulations restricting the importation of cotton and cotton seed into Southern Rhodesia shall be in force and effect:—

1. For the purposes of these regulations the following terms shall, if not inconsistent with the context and subject matter, have the meanings respectively assigned to them:—

"British South Africa" shall mean the British Possessions and Protectorates in that portion of Africa south of the Zambesi River.

"Cotton seed" shall mean seeds of any species or variety of *Gossypium*.

"Seed cotton" shall mean cotton fibre with seeds adhering.

"Ginned cotton" shall mean cotton fibre from which all seeds have been removed by passage through a ginning machine, but shall not refer to cotton fibre which has undergone a process of manufacture.

2. The importation of "cotton seed" and "seed cotton" into Southern Rhodesia from places outside British South Africa shall be limited to introductions made by or under the direct supervision of the Minister of Agriculture and Lands, and subject to such restrictions and conditions as he may deem necessary.

3. No person shall introduce into Southern Rhodesia from places within British South Africa any "cotton seed" or "seed cotton" except under the authority of a permit, the granting of which shall be at the discretion of the Minister of Agriculture and Lands, who may attach such conditions to the importation as he may deem desirable.

4. No person shall introduce any "ginned cotton" into Southern Rhodesia except under the authority of a permit, the granting of which shall be at the discretion of the Minister of Agriculture and Lands, who may attach such conditions to the importation as he may deem desirable.

5. Any person guilty of a contravention of the provisions of this regulation, or any of the conditions imposed upon any permit granted in terms hereof, shall be liable to a fine not exceeding £10.

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Government Notice No. 574.]

[31st August, 1928.]

GAME LAW CONSOLIDATION ORDINANCE, 1906.

IT is hereby notified that His Excellency the Acting Governor-in-Council has been pleased, in terms of section 4, sub-section (2) of the "Game Law Consolidation Ordinance, 1906," to suspend the operations of sections 9 and 12 of the said Ordinance in so far as they relate to the killing, hunting and capturing of game in classes "A" and "B" from the 24th August, 1928, until the 31st December, 1928, in that portion of the Darwin native district lying east of longitude 32°.

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Government Notice No. 580.]

[31st August, 1928.]

ROAD ALTERATION ORDINANCE, 1903.

IT is hereby notified that His Excellency the Governor has been pleased, in terms of section 1 of the "Road Alteration Ordinance, 1903," to approve of the closure of that portion of the road from Bulawayo to Hope Fountain Mission, commencing at a point on the northern boundary of Sub-division No. 5 of Matsheumshiope Estate near the common beacon of Sub-divisions 1 and 5; thence proceeding in a southerly direction through Sub-divisions 1, 5, 6, 9 and 10, the north-west corner of Douglasdale and Hope Fountain to the homestead thereon, as declared under Government Notice No. 419 of the 13th August, 1920.

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Government Notice No. 578.]

[31st August, 1928.]

IT is hereby notified that His Excellency the Governor has been pleased, in terms of section 1 of the "Road Alteration Ordinance, 1903," to approve of the closure of that portion of the road known as the Goromonzi Road where it crosses the farm Sebastopol from its northern to its eastern boundary.

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Government Notice No. 587.]

[7th September, 1928.]

POUND.

IT is hereby notified that His Excellency the Governor-in-Council has been pleased, in terms of section 5 of the "Pounds and Trespasses Ordinance, 1903," at the request of the Civil Commissioner, Salisbury, to establish a pound on the Government Reserve at Amandas, Mazoe native district, which pound will be available for the public as from the 15th September, 1928.

## Seed for Sale, 1928.

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	s.	d.
Salisbury White Maize, 2nd quality, per 100 lbs.	12	6
Kinvarra Oats ... .. per 100 lbs.	25	0
Linseed (Flax J.W.S.) ... .. per lb.	0	6
Boer Manna ... .. per lb.	0	4
Red Manna ... .. per lb.	0	4
Majorda Seed ... .. per lb.	1	0
Sweet Potato Slips ... .. per bag	5	0
Napier Fodder Roots ... .. per bag	5	0
Kikuyu Roots ... .. per bag	5	0

Prices are f.o.r. Gwebi. Before sending cheques, intending purchasers are advised to ascertain that the seeds required are still available. Cheques should be made payable to "Gwebi Farm." Orders and enquiries should be addressed to the Chief Agriculturist, Salisbury.

*Note.*—When remitting money in payment of seeds, etc., to assure prompt dispatch, it is necessary that railage should be included when goods are to be railed to a siding.



## Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

### AGRICULTURE AND CROPS.

- No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
- No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
- No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
- No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
- No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
- No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
- No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 374. Fibre Crops, by J. A. T. Walters, B.A.
- No. 388. Kudzu Vine, by H. G. Mundy, F.L.S.
- No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
- No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
- No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
- No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
- No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters, B.A.
- No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.
- No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.
- No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.
- No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 539. Barley Growing.
- No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
- No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.
- No. 550. Onion Growing under Irrigation, by C. Mainwaring.
- No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
- No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
- No. 591. Maize Export Conference Proceedings.
- No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
- No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
- No. 601. Maize for Export, by S. D. Timson.
- No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 616. The Ground Nut or Monkey Nut, by C. Mainwaring.
- No. 627. The Growing of Potatoes in Southern Rhodesia (Revised), by C. Mainwaring, Agriculturist.

- No. 630. The Storage of Seed Potatoes, by H. C. Arnold.  
 No. 634. Barley, by P. V. Samuels.  
 No. 643. Noxious Weeds in Southern Rhodesia, by F. Eyles, Botanist.  
 No. 650. Coffee Culture in Southern Rhodesia, by G. W. Marshall, Horticulturist.  
 No. 651. Two Important Leguminous Crops: The Velvet Bean and Dolichos Bean, by C. Mainwaring, Agriculturist.  
 No. 656. Tractor Notes, by A. W. V. Crawley, M.E., F.G.S.  
 No. 657. Hay-making in Southern Rhodesia, by C. Mainwaring, Agriculturist.  
 No. 663. The Use of Fertilisers and Manures in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.  
 No. 672. Hay-making in Rhodesia, by H. G. Mundy, Dip.Agric., F.L.S.  
 No. 674. Top Dressing of Maize against Stalk Borer, by H. C. Arnold.  
 No. 681. The Sunflower (*Helianthus Annuus*) (Revised), by S. D. Timson, M.C., Dip.Agric.  
 No. 684. Warning to Maize Growers: Maize for Export.  
 No. 694. The Edible Canna (*Canna Edulis*), by D. E. McLoughlin.  
 No. 695. The Castor Oil Plant (*Ricinus* spp.), by S. D. Timson, M.C., Dip.Agric.  
 No. 697. Results of Analysis of Samples taken under the "Fertilisers, Farm Foods, Seeds and Pest Remedies Ordinance" during the year 1927-28.  
 No. 704. The Importance of Research on Pasture Improvement in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.  
 No. 705. Suggested Cropping Programmes for Farms on the Sand Veld, by D. E. McLoughlin, Assistant Agriculturist.  
 No. 706. A Farmers' Calendar of Crop Sowings, by C. Mainwaring, Agriculturist.  
 No. 708. Witch Weed or Rooibloem (*Striga Lutea*)—a Serious Menace to Maize, by J. A. T. Walters, B.A., F.R.S.A., Agriculturist.  
 Botanical Specimens for Identification.  
 Maize Grading Regulations.

#### REPORTS ON CROP EXPERIMENTS.

- No. 94. Second Report on Experiments, by J. H. Hampton.  
 No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.  
 No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.  
 No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.  
 No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.  
 No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.  
 No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.  
 No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.  
 No. 341. Report on Crop Experiments. 1918-19, Gwebi Experiment Farm.  
 No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.  
 No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.  
 No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.  
 No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.  
 No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G. Mundy, F.L.S., and E. E. Wright.  
 No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.



- No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.  
No. 437. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1921-22, by H. G. Mundy, F.L.S.  
No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.  
No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.  
No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.  
No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.  
No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.  
No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923-24, by H. G. Mundy, Dip.Agric., F.L.S.  
No. 564. A Maize Rotation Experiment, by A. R. Morkel.  
No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.  
No. 608. Annual Report of Experiments, 1924-25, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.  
No. 631. Bulawayo Experiment Station: Annual Report for Year 1925-26, by H. W. Hilliard.  
No. 649. Annual Report of Experiments, 1925-26, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Manager.  
No. 675. Bulawayo Experiment Station—Annual Report for Year 1926-27, by D. E. McLoughlin.  
No. 683. Annual Report of Experiments, 1926-27, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Station Manager.  
No. 685. Notes on Farm Practices at the Government Farm, Gwebi, by S. D. Timson, M.C., Dip.Agric.  
No. 688. Report, 1923-24—1926-27, Gwelo Municipal Demonstration Stations, by D. E. McLoughlin.  
No. 700. Further Notes on Farm Practice at the Government Farm, Gwebi, by S. D. Timson, M.C., Dip.Agric.

## TOBACCO.

- No. 605. Flue-Curing Tobacco Barns, Bulking and Grading Sheds, by P. H. Haviland, B.Sc. (Eng.), Acting Government Irrigation Engineer.  
No. 607. Tobacco Seed Beds, by D. D. Brown.  
No. 614. Notes on Installing the Johnson Patent Furnace, by B. G. Gundry, Office of Irrigation Engineer.  
No. 615. The Culture of Virginia Tobacco in Southern Rhodesia—Field Management, by D. D. Brown.  
No. 617. Dark Fire-Cured Tobacco, by E. M. Matthews, B.Sc., Tobacco Adviser. Fire-Curing Tobacco Barn, by the Tobacco Advisers.  
No. 629. Notes on Flue Curing of Tobacco, by C. A. Kelsey Harvey.  
No. 641. The Handling, Grading and Baling of Cured Virginia Tobacco, by D. D. Brown.  
No. 644. Tobacco Baling Boxes, by B. G. Gundry, Irrigation Branch.  
No. 653. The Care of Tobacco Seed Beds, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A. (Trinidad).  
No. 661. Flue-Curing Tobacco Barns, 12 ft. x 12 ft. x 16 ft., by B. G. Gundry.  
No. 665. Tobacco Pests of Rhodesia, by Rupert W. Jack, F.E.S., Chief Entomologist.  
No. 671. Wildfire and Angular Spot of Tobacco, by J. C. F. Hopkins, B.Sc., A.I.C.T.A.  
No. 676. Mosaic Disease of Tobacco, by J. C. F. Hopkins, B.Sc., A.I.C.T.A.  
No. 679. Tobacco Culture in Southern Rhodesia: The Harvesting and Curing of Virginia Tobacco, by D. D. Brown.



- No. 689. The Lesser Tobacco Wireworms, by Rupert W. Jack, F.E.S.  
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Gorge on the Umshandige River, near Fort Victoria. See editorial note.



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## Editorial.

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*Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—  
The Editor, Department of Agriculture, Salisbury.*

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**The Umshandige Gorge.**—We reproduce on the opposite page a photograph of the gorge on the upper boundary of the farm Game Park, Victoria district, through which the Umshandige River flows. The gorge is situated in a low range of hills, the top of the ridge on the left bank being about 200 feet above water level. Solid rock is exposed on both banks, that on the left bank being almost vertical for a height of 100 feet. In the gorge itself the river flows in a deep pool, with large boulders showing above the water surface at intervals, and it is probable that solid rock is exposed in the river bed. A possible site for a large arched concrete dam exists at the upper end of the gorge. The width across the gorge at water level is 40 feet, and the width on the crest of a dam 80 feet in height would be about 150 feet.

The gorge itself is about 300 yards in length, and a suitable site for a low concrete diversion weir exists at the end of the gorge. The engineering branch of the Department of Agriculture considers there would be no difficulty in taking out furrows on both banks of the river at this point and irrigating good land in the Inyanda block.

No detailed survey has as yet been made on this site, but it is hoped to do this at a later date. It is possible that the water available here might permit of the irrigation of 2,000 acres in this area.

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**The Citrus Industry of Rhodesia.**—The growing importance of the citrus industry in Rhodesia is reflected in the export trade of this fruit, which this season has eclipsed all previous records. Complete figures of the quantity of fruit shipped are not yet available, but it is expected that the total railed for export will be in the neighbourhood of 175,000 cases of oranges and grape fruit. Last season we exported from Southern Rhodesia 138,905 cases; in 1926, 34,945 cases, and in 1925, 68,784 cases. The prices this season have been very satisfactory and as much as 50s. per case has been paid for fruit of exceptional quality. The citrus crop in Rhodesia in point of yield and quality was an extremely good one, and altogether growers have every reason to be satisfied with the season's operations. The bulk of the fruit has come from the British South Africa Company's estates at Mazoe, Sinoia and Umtali, exporters of smaller quantities being the Riversdale Estates at Glendale and Marodzi, Capt. Moubray of Shamva, Messrs. Knight and Folkestad of Hartley, and Mr. H. Harper of Fort Victoria. New exporters this year were Lt.-Colonel Carpenter of Garvin Spur, Mr. F. W. Bowring of Shamva, Mr. J. B. Kirstein of Enkeldoorn and Mr. J. H. Johnston of Garvin Spur.

There were several factors which accounted for the keen demand for South African oranges and grape fruit this year, the principal being lack of competition from California, the partial failure of the English soft fruit crop, and the hot summer experienced at Home. Apart from this, there is no doubt that the British public is now realising more fully the health-giving properties of citrus fruits, and they are becoming necessary items in the dietary. For this we have largely





Portion of record consignment of 15,000 cases of Rhodesian citrus fruits at Beira waiting to be shipped to England per Llandoverly Castle, September, 1928.



Carrying the fruit from the railway shed to lighter for shipment.





to thank the Empire Marketing Board, which has done so much to introduce Empire products to the consumer at Home. South Africa and Rhodesia are fortunate in being able to supply the Old Country with citrus fruits when they are most needed, and there is no doubt that a great opportunity lies before us if we utilise it.

At the present time many of the trees which have been planted have not yet come into bearing, and it is quite possible that the present output will be doubled in the course of a few years. It is interesting to note that, due to the enterprise of the Co-operative Fruit Growers' Association of Rhodesia, Ltd., Rhodesian oranges have been on sale at one time or another during the past two years in the following countries:—Canada, Belgium, Holland, Germany, Denmark, France, Madeira, Greece, Egypt, India, and the Straits Settlements, while enquiries have been received from many other markets offering favourable prospects. Awards have been gained by Rhodesian citrus fruits in open competition in several countries, and there is no question that the quality of our fruit is satisfactory. It is essential, however, for the future of the industry, that this standard should be maintained.

At the present time only a small portion of the areas in Southern Rhodesia where citrus fruits can be grown successfully has been utilised, and there is scope for very large expansion of the industry. I may be of interest to recall the remarks of Professor Herbert J. Webber, Ph.D., D.Agr., Director of the Citrus Experiment Station, and Professor of Sub-tropical Horticulture, University of California, who was commissioned to report on the citrus industry of South Africa and Rhodesia. In his report Professor Webber stated:—"I may say frankly that South Africa, as a whole, has impressed me as a country of enormous and wonderful possibilities. California, which is now the Mecca of horticulturists the world over, probably has no natural advantage not possessed by South Africa in equal degree. If I were a South African, I should probably claim it to be superior to California. The enormous tracts of high rolling tablelands, with an attractive and salubrious climate, that form the great interior part of the country, with generally good soil and a summer rainfall of from 25 to 30

inches, certainly have advantages for many types of agriculture and many crops not yet grown."

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**Weather Forecasts.**—The issue of a daily weather report and short period forecasts will be resumed on the 1st November. These forecasts will be issued at noon daily throughout the season and cover a period of 48 hours. Last season they were telegraphed to the following centres:—Arcturus, Belingwe, Bindura, Bromley, Bulawayo, Banket Junction, Ballineety, Carnock, Concession, Darwendale, Glendale, Gatooma, Gwelo, Glenara, Heany Junction, Hartley, Hunter's Road, Inoro, Inyazura, Lydiate, Makwiro, Marandellas, Mazoe, Nyabira, Norton, Penhalonga, Premier Estate, Plumtree; Resident Engineer, Limpopo Bridge, Messina; Rusape, Shamva, Shagari, Shangani, Sinoia, Victoria, Wellesley and Zomba. Farmers in these localities can obtain a copy of the forecast on application to the postmaster or postal agent. Farmers in other localities who may require these forecasts should inform the Hydrographic Engineer, Department of Agriculture, and arrangements will be made to telegraph the information to the nearest post office.

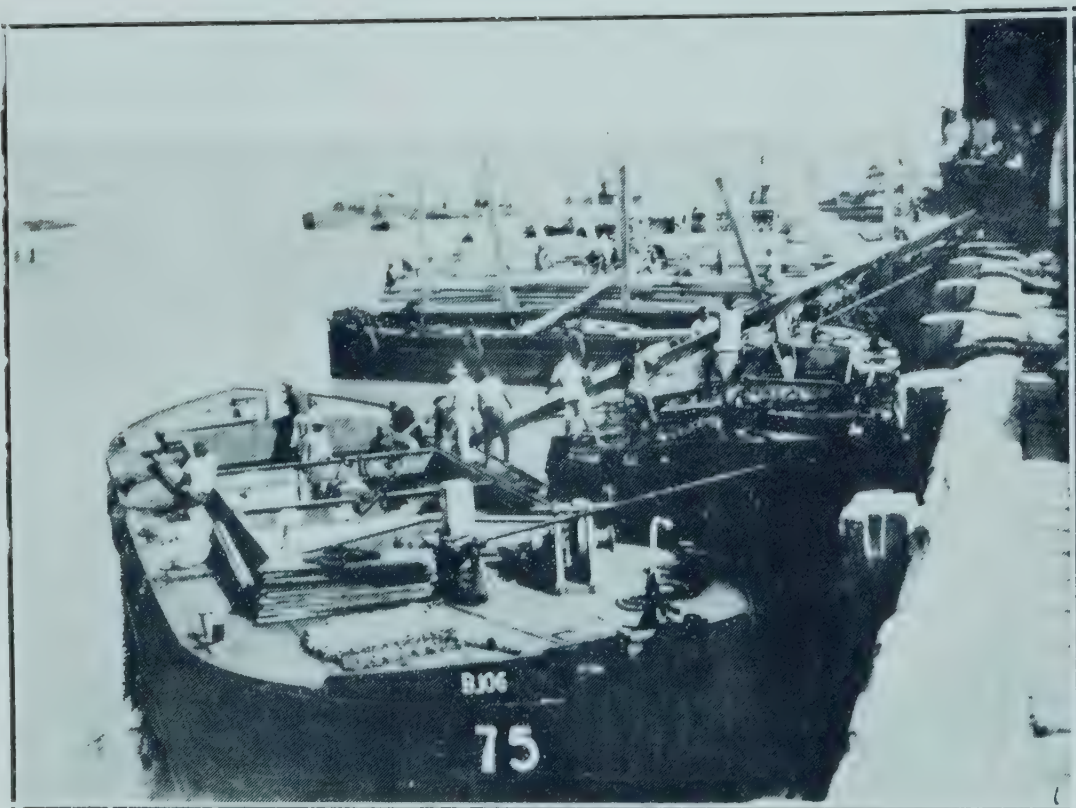
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**The Marketing of Empire Timber.**—We are indebted to the Empire Marketing Board for a copy of the tenth report of the Imperial Economic Conference dealing with the preparing for market and marketing of timber. As usual, the committee has accumulated a mass of important and interesting information and has presented a report of extreme value. We quote some of the conclusions arrived at:—

"The adequacy of the world resources of timber, especially of soft woods, to meet the world consumption of the future, is causing grave anxiety to forestry authorities. We have not found this feeling of apprehension shared generally by members of the timber trade in the United Kingdom."

"We, therefore, suggest to the forthcoming British Empire Forestry Conference the need of satisfactory arrange-





Loading the lighter at Beira with Rhodesian citrus fruits by chute instead of by crane.



Tray of fruit ascending from lighter to Llandoverry Castle, Beira, September, 1928,



ments for collecting and maintaining statistics of the world demand for timber as well as of the merchantable supplies."

"The total value of timber, manufactured wood and wood pulp imported into and retained for consumption in the United Kingdom in 1927 was £67,000,000.

"Of the timber imported into the United Kingdom in the year 1926, approximately 95 per cent. of the soft woods and 70 per cent. of the hard woods were derived from foreign and not from Empire sources."

"It is from Canada that any large increase in supplies of Empire-grown soft woods is to be expected, and attention is especially directed to the possibilities of extending the use in the United Kingdom of Douglas fir from British Columbia."

"We propose that arrangements should be made to enable the Forest Products Research Laboratory at Princes Risborough to undertake work on behalf of the Overseas Empire as one of its normal functions, and we recommend the attention of the Empire Marketing Board to this matter."

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**Soil Erosion.**—This is a subject which has received a considerable amount of attention in the pages of this Journal, and in season and out of season the Irrigation Branch of the Department of Agriculture has missed no opportunity of pointing out to farmers of this Colony the vital necessity of protecting their lands against the ravages of storm water. It is pleasing to note that the warnings which have been issued have not fallen on deaf ears, and that many farmers are taking active measures to combat the evil. For instance, during the period August, 1927, to September, 1928, no less than 79 farms were visited by the engineers of the Department for the purpose of giving advice on soil erosion. Of this total, 34 received advice only; on the remainder, storm drains to a total of 10 miles were pegged out on 21 farms, while contour ridges were pegged out on 33 farms to a total length of 34 miles, which is an average of just over one mile per farm. The maximum amount pegged out on any one farm was 3½ miles. The above figures do not include erosion works pegged out by farmers themselves. On one



farm a farmer has pegged out and constructed 10 miles of contour ridges, while on another 12 miles of drains have been pegged out and constructed.

We are pleased to record one instance where, although no land has yet been cultivated, measures have been taken by the construction of storm drains and contour ridges to prevent soil washing off the area which is to be brought under the plough. *Prevention is better than cure.* To this extent then have measures been taken during the past year to prevent the soil of this Colony from being washed away to the Indian Ocean.

There are very few farms in this Colony where some measure of protection against soil erosion is not necessary. Apart from the unchecked washing of cultivated lands, overstocking and the burning of grass are other causes of soil erosion. The land being denuded of its vegetal covering, small waterways are opened up which in a short space of time develop into wide dongas, causing irrevocable damage.

We would urge all those who are interested in this subject—and there must be very few farmers who are not—to read carefully the article which Mr. P. H. Haviland has written for this issue of the Journal. The subject is a large one, and all that he has to state cannot be compressed within the compass of one issue, and it will therefore be continued in subsequent numbers. Mr. Haviland has made a special study of soil erosion, and he deals with it in a very comprehensive manner. Our advice to farmers is to put into practice without delay the measures which he advocates.

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**Agriculture in Kenya.**—We have to acknowledge the receipt of the annual report of the Department of Agriculture, Kenya, for the year 1927. The report is a comprehensive document of 300 odd pages, and constitutes a very complete record of the activities of the Department.

We notice that the total area allotted for occupation by Europeans in Kenya is approximately 5,000,000 acres, and that in addition to this an area of about 2,000,000 acres is available for alienation. Of the area allotted, 4,737,920 acres are under occupation, showing an increase of 150,103

acres over the previous year. The number of occupiers totals 1,901, or an increase of 92 over the previous year. The total area under crops, European, was 438,035 acres, of which total 192,592 acres were under maize, 65,036 under wheat, 74,662 acres under coffee, 71,213 under sisal, 4,093 acres under barley and 3,156 acres under tea. The average yield of maize over the whole country was 7.39 bags per acre. It is of interest to record the fact that the Kenya Farmers' Association, through which organisation a number of maize growers market their crop, voluntarily offered to levy a cess on every bag of maize exported. The money so derived is handed over to Government to be applied towards the development of maize growing.

Wheat has increased in acreage from 15,158 acres in 1922-23 to 46,601 acres in 1926-27, yielding 120,569 bags. Where suitable varieties are grown on properly prepared and suitable land, yields of from five to ten bags per acre over large acreages have been recorded. It is stated that even at export prices such crops pay, and that there is a much greater feeling of security with the wheat crop to-day than ever before. It is confidently expected that wheat growing will increase in popularity when the causes for low yields are better understood. Drought and the unsound choice of soil and varieties have been the chief contributory factors in causing low yields this year. The hope is expressed that the new wheats evolved by the plant breeder, which are resistant to both yellow and black rusts, will overcome the difficulties with which Equator wheats seem unable to cope.

The export value of coffee shows an increase from £727,453 in 1926 to £1,140,549 in 1927. There are 749 coffee planters in the Colony. The outturn of sisal was much increased, but, owing to the fall in prices, the value of fibre exported in 1927 was only £468,974, as against £579,499 in 1926.

The total value of agricultural exports, the produce of Kenya, in 1927 was £2,731,794, an increase of £482,073, compared with the previous year.

The number of cattle owned by Europeans in 1927 was 215,650, and of wool-bearing sheep 209,299. The value of wool exported in 1927 was £64,561.



**Beef Trade of the United Kingdom.**—We observe from a bulletin issued by the Ministry of Agriculture and Fisheries, England, that the annual average prices of beef in 1927 were generally lower than in 1926, but examination of the monthly averages shows that although, apart from seasonal fluctuations, the level of English beef was steadily falling last year, there was in the case of imported beef a distinctly firmer tendency in the latter part of 1927. As a result, while first quality English beef was selling in December of last year at an average of 7½d. per lb. or nearly 1d. per lb. cheaper than a year earlier, imported beef was in the same month generally a little dearer on the year, the increase being rather more noticeable in frozen than in chilled. A further feature was that in November, 1927, Argentine chilled hindquarters were ½d. per lb. dearer than English second quality, and only ½d. per lb. cheaper than first quality, although in the corresponding month of the preceding year the Argentine grade was over 2d. cheaper than first quality English, and more than 1d. less than second quality. A gradual narrowing of the margin between English and imported beef has been in evidence for some years. In 1923 first quality English beef realised on the average nearly 3½d. per lb. more than Argentine chilled hindquarters, but in the next two years the difference diminished to 2½d. per lb. In 1926 the margin was maintained on the average at the 1925 figure, but, as has been shown above, it has lessened rapidly in the latter part of 1927.

Trade in store cattle was hardly brisk at any period during the year 1927. There was a little more life in the early months, during which prices rose slightly, but after April the demand continued to slacken, with a general fall in prices until the end of the year. Prices for store cattle were highest in April, when the average per head for first quality Shorthorn yearlings was £14 5s. and for first quality two-year-olds and three-year-olds was £18 15s. and £22 14s. respectively. There was a slight recovery in the average price of first quality three-year-olds in August, September and October, but otherwise prices for store cattle tended steadily downwards from April to December, when the average prices per head of yearlings, two-year-olds and three-year-olds were £12 14s., £16 16s. and £20 2s. respectively. Over the whole year the average price per head of first quality Shorthorn



yearlings was £13 12s. compared with £14 in 1926, and was about 30 per cent. above the level of 1911-13, while at £18 and £21 13s. the average two-year-olds and three-year-olds were about 24 and 18 per cent. above pre-war. Receipts of Irish store cattle in 1927 were 348,700, a reduction of over 44,000 compared with the previous year, and the lowest annual total since 1921.

The highest monthly average price per live cwt. for *first quality* Shorthorns was 53s. 4d. in June, and in November the average had fallen to 45s. 8d., the lowest monthly average recorded for first quality Shorthorns since the War. Imports of fat cattle from Ireland were 284,500 in 1927, a total which, although greater than that recorded in either 1926 or 1925, was decidedly on the small side when compared with earlier years. Canadian cattle slaughtered on arrival numbered about 6,000, against nearly 60,000 in 1926.

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**Afforestation in Rhodesia.**—We are pleased to note from the annual report of the Forest Officer that the general public in this Colony is giving increasing attention to the protection and utilisation of the indigenous forests and the planting of timber producing trees of exotic species. In the last issue of this Journal we published an editorial note showing what the Government is doing in this latter respect at Stapleford and Mtao. Previous to this, we drew attention to the inroads which the tobacco-growing industry was making into the indigenous forests of this Colony, and we quoted from an article which the Forest Officer had written containing the statement that to cure the tobacco crop of 1925-26 an area equivalent to at least 13,282 acres of eucalyptus trees would be required. It might be explained that there were no data available as to the average yields of indigenous savannah forests, and therefore the Forest Officer had to base his calculations on the known yields from eucalyptus plantations. These yields, however, are probably somewhat in excess of the average returns from the indigenous forests. The 1925-26 tobacco crop amounted to 5,569,800 lbs., whereas the crop the following year totalled 19,264,500 lbs. On the basis of these figures some 45,000 acres of timber would have been required to cure the crop.

In spite of the activity in tree planting which the Forest Officer records, we doubt very much whether planting is keeping pace with the cutting, and we consider it necessary to issue a further warning on the subject. The timber resources of this Colony are by no means inexhaustible, and we therefore urge upon farmers the vital necessity of making good the wastage, for unless immediate action is taken we fear the time is not far distant when there will be a serious shortage of timber in this Colony.

A classic example of a people suffering from extreme timber shortage is furnished by northern China. Abundantly provided with forests some 2,500 years ago, the population increased rapidly and cut timber as it was needed, wastefully and without thought for the future. The Government seldom or never interfered in whatever the people were pleased to do, so long as their actions did not endanger the peace of the country. Land clearing, wasteful cutting, and repeated fires, continuing through many centuries, gradually pushed the forests back, until now they are practically confined to the least accessible parts of the mountains. To get timber down to the principal consuming centres of the country requires from six months to three years' time, and an enormous amount of manual labour, because the transportation facilities are extremely primitive. This puts the cost of timber beyond the reach of the general public, and makes it an article of luxury which only the comparatively wealthy can afford to use. In many districts, timber large enough to make boards is so scarce that practically none is used except for the manufacture of coffins. The bulletin issued by the Department of Agriculture, Washington, U.S.A., from which we take these particulars, further states that there is no fuel with which to bake bricks; hence millions of families live in miserable huts of sun-dried or partly baked mud, with mud floors and roofs thatched with grass or straw and mud. The winters are long and cold, and the need for fuel correspondingly great, but the supply is utterly inadequate, and acute suffering is widespread. We do not suggest that this state of affairs will be repeated in Southern Rhodesia, but the moral is plain.

A perusal of the Customs Returns for the year 1927 shows to what extent this Colony relies upon outside sources

of supply for its timber requirements. For instance, our imports of manufactured and unmanufactured timbers amounted to no less than £270,529 during that period, all of which, in the opinion of the Forest Officer, could be supplied in the Colony. It would be thought that we could supply our own requirements of pick handles, wagon hubs, spokes, etc., yet we spent £12,602 on these items alone. Flooring and ceiling boards cost us £23,352, and empty boxes £12,170.

No country can look with any confidence to its future if it must rely on imports of an essential product which can be grown within its confines. Southern Rhodesia must become self-supporting in this respect because (1) it is not wise policy to be dependent on outside supplies; (2) certain parts of the Colony are capable of producing all the timber requirements; and (3) necessity demands action, because imports threaten to become prohibitively dear or unobtainable. Reliance on imports must end in disaster.



## Ensilage.

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By J. A. T. WALTERS, B.A., Agriculturist.

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The practice of making ensilage is by now almost universal in Rhodesia, and on most farms a definite area of crops is annually devoted to this purpose. The older farmers are thoroughly conversant with the methods and materials that give the best results, and the present article is written to serve as a guide to the newer settlers who are less acquainted with Rhodesian practice, and to whom the practice of conserving succulent material may be new. The necessity of some such provision to assist in carrying the live stock in good condition over the winter months must be obvious, and this frequently takes the form of growing such crops as pumpkins and majorda melons, sweet potatoes and edible canna, or even of growing such grasses as Napier fodder or paspalum, which remain green largely throughout the winter. Nothing, however, has been found more satisfactory and economical for this purpose than the practice of preparing ensilage, for the simple reason that succulent material of a suitable nature is so abundant in summer, and that the resultant foodstuff is so palatable and beneficial.

**Place on the Farm.**—The principal value of ensilage in the economy of farming lies in the fact that it represents an attempt to store up summer feed for use during the winter months, and thus tends to even up the feeding conditions for the whole year. The long period of winter drought in Rhodesia would form a serious obstacle to stock rearing were such a provision not possible. Maize, grasses and legumes, when conserved in the silo, lose very little of their original succulence and palatability, and there is practically no loss in weight. Ensilage, therefore, provides an almost ideal method of storage for this class of foodstuff.

**Definition.**—Ensilage may be defined as green fodder which has been conserved in an air-tight pit or silo, or even in an open stack, and which has undergone a certain amount of fermentation in the course of storage. As is well known, heat is produced when green fodder is packed, and the whole art of ensilage-making may be said to consist in the regulation of this heat so as to prevent decomposition or rotting, which would result in a loss of carbohydrates and protein, but to allow a certain amount of fermentation to take place. This fermentation is responsible for the peculiar odour that ensilage possesses. Even in the making of ordinary hay a certain amount of fermentation is necessary, which is one of the reasons why it should be cut as early in the season as is possible, if it is to contain the full properties that characterise good hay.

**Material and Date of Cutting.**—Suitable material for ensilage is abundant in Rhodesia, and as wet weather is no hindrance, it can be cut at any time it is ready. Ordinary veld grass may be used, while kaffir corn, Napier fodder, sunflowers, sweet potato tops, velvet beans, Kudzu vine, cowpeas, dhal tops, lucerne, Sudan or teff grass (in the green stage) are all excellent for the purpose. The best single material, however, is undoubtedly *maize*, and when cut at the proper time, it is unequalled for the purpose. Careful estimates show that the *best period at which to cut* any fodder destined for ensilage is that at which it contains approximately 75 per cent. water and 25 per cent. of dry matter. Analyses of the maize plant at different stages of its growth are shown in the following table, and the weights per acre have been adapted to average Rhodesian conditions:—

Period of growth.	Water per acre.	Dry matter per acre.	Percentage of water.
Date of tasselling ...	10,000 lbs.	1,100 lbs.	90 per cent.
3 weeks later ...	17,500 ..	2,900 ..	85 ..
5-6 weeks later ...	15,600 ..	4,500 ..	77 ..
8-9 weeks later (crop ripe)	12,500 ..	5,000 ..	71 ..

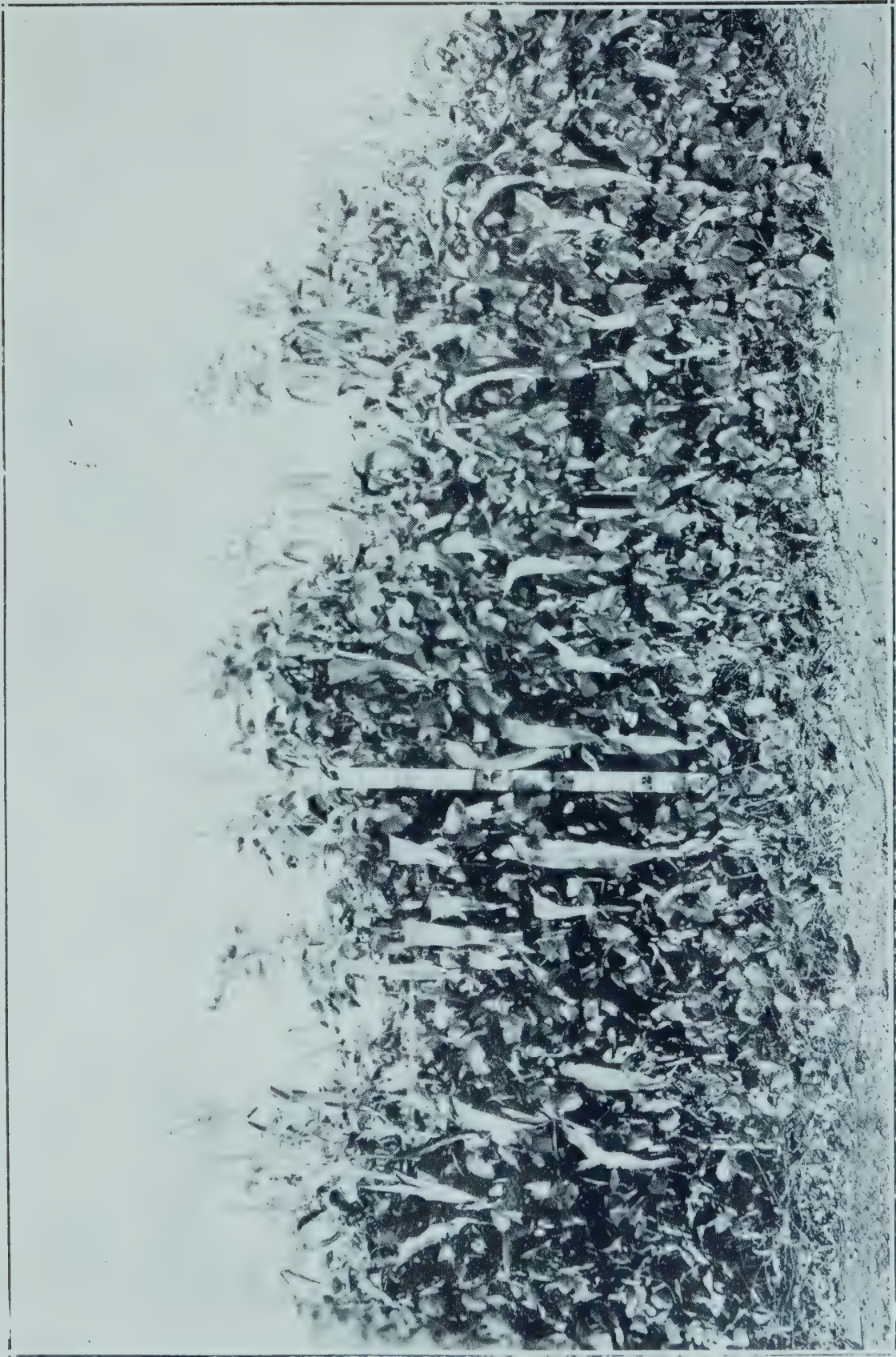
From these figures it will be seen that the proper time for cutting maize for ensilage is about the *fifth or sixth week after flowering*. If the farmer therefore notes the period his ensilage mealies are in flower, he will know when to cut with the greatest advantage. Other methods may be employed to determine the right time for cutting maize. If the cobs are examined they should be well over the milky stage and should clearly show the indentations. The lowest leaves of the plant will also be turning brown at this stage.

**Advantage of Mixtures.**—It is undoubtedly an advantage in the preparation of ensilage to utilise more than one crop, and if possible to include a leguminous crop, with a view to adjusting the *nutritive ratio* of the ensilage, or in other words to improve the “balance” of the material. The *velvet bean or dolichos bean* is an excellent crop for this purpose, and can be grown either separately, or better still in among the maize intended for ensilage. Being a climber it will utilise the maize plants as a support, and as it is a slow grower it may be planted from 10 to 14 days before the maize, or the two may be planted at the same time. Plate I. shows a stand of maize and velvet beans grown under these conditions. Other suitable legumes are cow-peas, kaffir beans, Kudzu vine, or ground nut tops.

Another plant frequently recommended for inclusion in the constituents of the ensilage pit is the *sunflower*, partly on account of the oil content of its seeds and partly on account of the food value of its stems and leaves. The following analysis, showing the percentage of *digestible nutrients* in ensilage, gives an indication of its value:—

		Total dry substance.	Crude protein.	Crude fibre and carbo- hydrates.	Ether extract.	Ratio.
		Per cent.	Per cent	Per cent.	Per cent.	
Sunflower	...	21.4	1.2	10.1	0.4	9.8
Mature maize	...	26.3	1.1	15.0	0.7	15.1
Immature maize	...	21.0	1.0	11.4	0.4	12.3
Velvet bean	...	25.0	3.8	18.9	0.5	7.8





Maize and velvet beans grown for ensilage at Agricultural Experiment Station, Salisbury.





The quantity recommended is one acre of sunflower for every four acres of maize, the sunflowers being sown separately, or the sunflower crop may be undersown with velvet or dolichos beans.

**Planting Distances of Crops for Ensilage.**—Experiments conducted at the Agricultural Experiment Station, Salisbury, show that ensilage maize may be planted at the same distance as that generally used for grain. Plantings spaced in rows 30-36 inches apart by 15-18 inches gave an increase of over 10 per cent. in gross weight of fodder over the planting at 6 inches apart in the row, and the quality of the fodder was enhanced by the presence of a normal number of well-formed cobs, whereas with closer planting cobs were fewer and badly formed. The stalks were, however, rather coarse for fodder. When fine stalks are required and a fair development of cob, plantings at about 30 x 15 inches to 36 x 12 inches are recommended.

**Variations in the Finished Product.**—Whatever material or combination of materials is used for ensilage, it is usually cut before being put in the ensilage pit. Heating and fermentation set in almost immediately, and these can be controlled by the farmer, who thereby controls the nature of the resulting ensilage. Thus if the pit is filled slowly and the stuff is not well tramped great heat will be produced and decomposition or rotting may set in. This is due to the fact that the oxygen in the air produces combustion. If the material is packed tightly by tramping, and the pit filled a little more quickly, less heat will be evolved in proportion as the air is excluded. In this way fermentation can be controlled and decomposition prevented. The ideal *temperature* for ensilage-making ranges between 120 and 160 degrees (Fahrenheit). If the temperature exceeds 160 degrees it becomes blackened or burnt and may be useless. Within this range, however, a variety of qualities may be obtained, for the reason that different bacteria are promoted at the different temperatures. At the lower temperatures organisms producing lactic and acetic acids are active, resulting in *sour* ensilage; at the higher temperatures other bacteria form products resembling alcohol, which gives *sweet* ensilage its characteristic fruity or vinous smell. These different degrees may be stated as follows:—



Under 120 degrees—sour ensilage.

120 degrees to 130 degrees—slightly acid.

130 degrees to 140 degrees—sweet green ensilage.

140 degrees to 160 degrees—sweet brown ensilage.

Over 160 degrees—burnt.

The best ensilage is made at about 130 degrees, and is neither sweet nor sour, but it should be remembered that sour silage keeps better than sweet after the pit is opened. Ensilage should not be fed until fermentation has entirely ceased, *i.e.*, not for about six to eight weeks after the pit has been closed.

**Method of Filling.**—In filling the ensilage pit or silo, from four to six feet are filled in at a time and pressed down as firmly as possible. Care is required to ensure that the stuff at the sides is well tramped. The centre can be left to look after itself. The rise in temperature will occur almost immediately, and may be tested by plunging the hand into the heap or by using a thermometer, inserting it about two feet below the surface. In actual practice it may be assumed that if the fodder is cut at the right time and filled at the rate of *four to six feet per day*, good ensilage will result. If it is thought that the temperature does not rise rapidly enough, one day's heap should not be tramped until the following morning; this will promote a rapid rise in the heat. If the material used is too dry, this condition may be corrected by pouring water on the mass, otherwise there is danger of dry rot, which will seriously impair its quality. Whatever fodder is used, it is improved by chaffing into pieces from one-half to one inch long before putting it into the pit. Chaffing helps it to pack better, and makes it easier to remove the ensilage when the pit is opened. Small quantities of *salt* may be added to the silage with advantage; Wrightson recommends the use of  $1\frac{1}{2}$  lbs. of salt for every ton of green material used, to be sprinkled over the ensilage as it is made. The pit should be filled about two or three feet above the surface to allow for the subsequent shrinkage, and covered with a foot or so of veld hay or straw; the whole should then be weighted down with a covering of several feet of earth. Any cracks that form during shrinkage should be immediately filled. Provided that the finished pit stands slightly above the level of the adjoining soil after shrinkage, and that

water does not enter through the bottom or sides, the ensilage should keep good for several seasons.

**Size of Pit.**—From what has been said about the exclusion of air it will be obvious that a deep pit is preferable to a shallow one. The effect of depth on packing may be seen from the fact that the average weight of a *cubic foot* of ensilage to a depth of 15 feet is approximately 30 lbs., while to a depth of 30 feet it averages 40 lbs. In Rhodesia it is rare to find pits over 20 feet deep, and experience has shown that a depth of about 15 to 20 feet is most convenient for emptying. Where overhead silos are built they are frequently 50 feet high, and special arrangements in the form of continuous doors have to be provided for feeding out the stuff. For ordinary purposes in this country a pit 15 feet deep, 24 feet long and 15 feet broad will be found convenient for farm use. It will hold 67 tons of ensilage, which can be grown on nine acres, and will suffice to feed 36 animals for four months. A circular pit to hold the same amount would require to be 22 feet across, *i.e.*, to have a radius of 11 feet. If very large quantities of ensilage are required, it is advisable to use a number of pits rather than one very large one.

**Pits, Silos and Stacks.**—In the above remarks reference has always been made to the pit. The pit is an ideal method of conserving ensilage in this country, for the reason that our winters are dry and pits may be dug at any period after the heavy rains. It is also usual to feed the whole of the ensilage during the following winter. The pit is thus cheap, economical and effective. It is sometimes lined with brick or stone, but this is not essential. If after a season or two the pit becomes unserviceable a new one is dug and the old one may be used to hold kraal manure or rubbish.

*Overhead silos* are the rule in America, and are more generally constructed of timber, less frequently of stone or other material. In the Union of South Africa silos are frequently found built of stone or brick, and constructed partly below ground and partly above. The *stack* is not often met with in South Africa. It is the simplest method of all of conserving ensilage, but it is the most wasteful. This method consists of storing the green fodder above



ground, as is done with hay, in the form of a stack, and its effectiveness lies in the fact that the mould which forms on the outside and penetrates to a depth of a foot or more constitutes an air-tight cover which prevents further decay. Chaffing is not practical in this case, and whole maize stalks are generally used. It is necessary also to weight the stack well with stones or timber placed on top. Such stacks should be as big as is convenient in order to curtail waste, and when opened should be fed rapidly. They should also be erected some distance away from the homestead, as the odour is liable to be overpowering.

**Analyses.**—Analyses of ensilage will, of course, vary according to the material used. On an average, maize ensilage will contain about 75 per cent. water, 2 per cent. protein, 12 per cent. carbohydrates, 1 per cent. fat, 8 per cent. fibre and 2 per cent. ash. The addition of leguminous crops will improve the “balance” by increasing the total amount of protein present; or again in feeding the “balance” may be restored by including feeds like oil cake, velvet bean hay, lucerne, or beans in the daily ration of the animals. A point of greater interest in connection with silage is its *digestibility*. The total amount of digestible matter in any foodstuff is usually computed as the difference between the fodder fed and the solid excrements of the animal. There would seem to be no doubt that ensiling a crop maintains its digestibility as no other process of storage does. The annual report of the Ontario Experiment Station gives the result of an experiment to test the percentage of digestibility of maize ensilage as follows:—Protein 55 per cent., fat 61 per cent., carbohydrates 74 per cent. and crude fibre 74 per cent. In the “Feeding of Animals” (Jordan) the digestibility of dried maize fodder is given as 70.7 out of every 100 parts of organic matter, while ensilage made out of similar material gave an average of 73.6 digested. Maize stalks allowed to stand in the field after maturity show at the end of two months a loss of about one-half in the dry matter they contain, and more than one-half of the feeding value.

**Feeding of Ensilage.**—The rate at which ensilage can be most profitably fed to animals has been the subject of considerable experiment, and most experimentalists are agreed





Silage pit.



in placing the quantity at about 30 lbs. per day for dairy animals, a little more to beef animals, and from 15 lbs. to 20 lbs. a day for horses and mules. It can also be fed with advantage to sheep, and even to poultry. It has a slightly laxative effect when fed in large quantities, but this is not apparent when used in addition to dry feed. Silage is said to taint milk, but this is due to the fact that milk very readily absorbs odours, and if the silage is fed after milking, and the milk is kept from coming into contact with the silage, no danger need be apprehended. Its beneficial effect upon the milk supply is very striking, and trials have shown that only one feed—mangels—gives better results in this respect.

A matter of great importance to the farmer is an estimate of the acreage of fodder that has to be grown for ensilage in order to feed a given number of cattle for a given number of weeks. The following formulas will enable the farmer to gauge both the acreage he will require to grow and the size of the pit or silo he will require to construct:—

1. The quantity of ensilage recommended to be fed is about 30 lbs. per day per beast.

2. An acre of maize or maize and velvet beans yields about eight tons at the time of cutting. This will produce about seven tons of ensilage.

3. Ensilage shrinks to about five-sixths its original size in the course of a few weeks' time. In the following formulas and tables the size given for the pit has been increased to allow for this fact.

4. Multiply the number of cows by the number of weeks to be fed and divide by sixty-six. This will give the number of acres to be put under maize for ensilage. Example: 15 cows or oxen require to be provided with ensilage for 17 weeks,  $15 \times 17$  equals 255; divided by 66 equals  $3\frac{3}{4}$ , say 4 acres.

5. Size of pit. For every ton of ensilage allow 80 cubic feet. For every acre of ensilage maize allow 560 cubic feet.

6. Conversely, if the pit has been dug, it will store one ton of ensilage for every 80 cubic feet, and for every 560 cubic feet one acre of maize must be grown to fill it.

7. The following tables will save the farmer the trouble of working out formulas:—



No. of cows to be fed for 4 months (17 weeks).	Quantity (in tons) of silage required.	Cubic content of silo or pit required.	Acreage of maize needed.
6	11 tons	880 cubic feet	1½ acres
9	16½ „	1,320 „	2½ „
15	27 „	2,160 „	4 „
20	36 „	2,880 „	5 „
25	45 „	3,600 „	6½ „
32	58 „	4,640 „	8½ „
72	130 „	10,400 „	19 „
100	180 „	14,400 „	26 „

If the pit has been dug:—

Size of pit.	Quantity of silage it will hold.	Acreage of maize required to fill it.	No. of cattle it will feed for 1 month.
400 cubic feet	5 tons	$\frac{3}{4}$ acre	11
700 „	9 „	1½ „	20
1,000 „	12½ „	2 „	27
1,500 „	19 „	3 „	42
2,500 „	31 „	4½ „	69
4,000 „	50 „	7 „	111
10,000 „	125 „	18 „	276

The above figures for the *acreage* necessary for the maintenance of a given number of cattle or to fill a certain size of pit will vary slightly according to locality. In districts like Mazoe or on rich lands generally, a slightly lower acreage will suffice; on sand veld or poor land the figures should be a little higher. The regular use of ensilage as an essential portion of the diet of live stock during our dry winter months cannot fail to be of the greatest value in maintaining the health of the herd or flock, and if in the preparation of this foodstuff an attempt is made to provide a well-balanced ration by the inclusion of legumes and other fodders, the effect on the milk supply of the dairy herd or on the gain in weight of the beef animals will amply repay the trouble which has been taken.

## Soil Erosion.

By P. H. HAVILAND, B.Sc. (Eng.), Assistant Irrigation Engineer.

There have already appeared in the *Rhodesia Agricultural Journal* for October, 1921, December, 1923, and November, 1925, three articles on soil erosion, reprinted as Departmental Bulletins Nos. 400, 475 and 565. Owing to the experience gained in this Colony and elsewhere, these bulletins must now be regarded as out of date, and this article is written with the object of putting the whole subject once more before the agricultural community, with such changes in methods as are the outcome of the experience gained during the past seven years. *It must again be emphasised that the importance of taking every step to combat soil erosion cannot be over-estimated.* It is to be regretted that a large number of farmers appear to be quite incapable of appreciating the extent to which their farms are suffering from soil washing, and one is inclined to think that the reason for this is that erosion appears to such individuals to be a word rather than a fact, or if a fact, to be of academic rather than practical importance. With this thought in mind, it seems desirable to explain briefly the general and natural erosion which has been taking place for centuries and which is to-day still occurring.

**General Natural Erosion.**—Erosion may be simply explained as the breaking down of the materials forming the surface of the earth and the movement of such material from one place to another. The breaking down or weathering of the earth's surface is caused by the agencies of temperature changes, wind and water, and it is with the two last named that the farmer has to deal. All land surface areas pass through a cycle of general erosion which results in the appearance of the physical features with which one is

familiar. An example will explain how this happens. A plain is elevated above the general level of the surrounding country, possibly by plutonic activity, and this plain is in an undenuded or uneroded state. Gradually, as a result of the drainage of rainwater, the small gulleys are formed, which slowly but steadily increase in size until the original plain becomes a mass of hills and valleys. The hills, being of a harder formation, resist more strongly the weathering forces waging war with them, but in the course of time they are destroyed, and a plain results once more. A plain resulting from such action would probably consist of good agricultural soil, but those portions of such a plain which had originally been hills would probably, for a great number of centuries, be quite unsuitable for growing crops. This is what happens to cultivated lands, and to a lesser degree uncultivated lands, when erosion takes place. Small hills and valleys are formed, the hills being actually ridges in a field, and the valleys the small gulleys and depressions so often occurring on cropped lands.

An examination of the growth of a valley is also enlightening. A small gully or slight depression is first formed, and owing to the increase in the speed of the water as it drops into and runs down this gully, the sides are eroded and the gully widens and deepens. At the same time the head of the gully gradually creeps back and up the prevailing slope until the bed reaches a base level which increases in size till the whole area is base-levelled and a flat or plain results.

This is occurring daily on a smaller scale on cultivated lands where nothing has been done to prevent soil erosion.

**Æolian Erosion.**—As well as water, wind is also an agent working for nature in the group of eroding agents. Such erosion by wind is termed æolian erosion.

The transportation of dust by wind is well known, and the fineness of the particles transported is recognisable by the fact that dust is deposited in every place to which a current of air has access. The removal of sand as well as the fine dust also occurs to a marked extent in many localities, particularly in the more arid districts where the vegetal covering of the land is thin. Moisture, by increasing the cohesion of the particles of earth, prevents their being removed by wind



action, and so the maintenance of a good water content in the soil is highly important in preventing æolian erosion.

**Evaporation.**—Evaporation has a direct bearing on the moisture content of the soil, and a few remarks on this will be useful.

The annual evaporation from a free water surface in this country is, on the average, nearly 8 feet. In California, where conditions are similar to those obtaining here, the evaporation from saturated sandy loam has been found to be at least twice the amount from a free water surface. With soils containing a smaller amount of moisture the evaporation, although much less, is nevertheless of practical magnitude.

*As moisture helps to bind the particles of earth together, it is highly important that the moisture content should be maintained.* Water is drawn to the surface from below by what is termed “capillary attraction,” the paths followed by such water being called “capillary tubes.” In order to prevent or reduce this drawing up, the capillary tubes must be broken up, and one of the best methods of doing this is by the maintenance of a good mulch on cultivated lands.

On lands such as pasture lands, which are not annually cropped, a good vegetal covering will reduce the evaporation by shading the soil, keeping it cool and protecting it from the drying action of the wind. The further effects of vegetation will be seen later.

**Erosion by Water.**—Examples of erosion by water have already been given in the general description of the natural erosion which is continually taking place, but it is difficult to appreciate the extent of this on farming lands, without considering such factors as silt in rivers, the run-off of storm water after rains and the effects of vegetation.

**Silt.**—The load carried by running water consists of two parts—(a) silt, and (b) pebbles and boulders. Silt is the very fine earthy material carried in suspension in the water, and although it has a tendency to fall towards the bottom of a stream or gulley bed, it is prevented from doing so on account of the smallness of the particles, which allows them to be lifted up by the numerous eddies always present in a rapidly flowing stream of water. The amount of silt transported by

a given quantity of water flowing at any given speed is, however, to an extent limited, as every increase in the stream's load causes a corresponding decrease in its carrying capacity.

The larger bodies, such as pebbles and boulders, are rolled along at the bottom and help to erode the bed still more. In this connection it is interesting to note that it requires a stream velocity of only  $3\frac{1}{2}$  feet per second to transport pebbles 1 inch in diameter.

As regards the quantity of silt carried in the rivers in this Colony, a few observations have been made on one or two rivers, and it would appear that about  $\frac{1}{4}$  inch of soil is lost annually from cultivated land in the Mazoe district. In years of heavy rainfall this amount will be much greater. The writer himself has seen on a certain farm a land which had been under cultivation for some 20 odd years, and which, owing to the non-existence of anti-erosion works, had been denuded of practically the whole of the top surface. The original yield of maize from this land was 20 bags per acre; the yield at the time of inspection had dropped to 4 bags of maize per acre. Green cropping and the use of artificial fertilisers had been resorted to, but no good had resulted, owing to the annual washing away of the soil and fertiliser.

The transporting power of water is high, and increases with the velocity at which the water travels. This transporting power varies as the sixth power of the velocity, which means that if a stream of water travelling with a certain initial velocity is just able to move a particle of a particular size, the same stream travelling at twice its original velocity will be capable of moving a particle 64 times as large as that moved in the first instance.

When the water enters a depression its velocity is increased, and as a natural result its destructive power becomes much greater, which accounts for the rapid growth of gulleys and washouts.

*Run-off of Storm Water.*—The percentage of the water falling on the land which is not absorbed by the soil but runs off in the form of storm water is high, particularly when the ground in the locality where the rain occurs is already saturated.



The amount of run-off depends on the following factors :

- (1) The distribution and amount of the rainfall in a catchment. In dealing with individual farms, the distribution is, for all practical purposes, equal over the whole area, and the amount becomes more important.
- (2) The average slope of the catchment.
- (3) The nature of the catchment, that is, whether it is cultivated land, has a porous or tight soil, and whether the soil is deep or shallow.
- (4) The nature of the covering, such as crop, grass, bush, etc.
- (5) Whether the catchment is saturated or not.

In dealing with soil erosion one must be prepared for the average worst conditions, and consequently it is necessary to consider the catchment as being saturated. The amount of run-off on a small catchment area may be appreciated by a study of the run-off figures for the Cleveland Dam, Salisbury. The size of the catchment is seven square miles, and consists of gently sloping grassed country with a sandy soil. The saturation point of this area occurs after a total rainfall of about 20 inches.

In the 1925-26 season the highest percentage storm run-off which occurred was 72.45 per cent. of the rain which fell, and the average between 1st October and the 31st March was about 24 per cent. Accepting a percentage run-off of 24 per cent., the amount of water which would flow off ten acres of land after a 3 inch rain would be 162,000 gallons. The run-off from cultivated land will be less than the above, but assuming that only 12 per cent. of a 3 inch rain runs off, the total from ten acres will be 81,000 gallons. With a run-off of 36 per cent., that is half the maximum percentage run-off from the Cleveland Dam catchment in 1925-26, from ten acres 243,000 gallons will wash over the land.

**Effects of Vegetation.**—It is evident from the preceding that erosion is a danger which must be dealt with rapidly and effectively, unless one is content to allow the country to develop into an arid waste in a very short time. *The encouragement of the growth of vegetation will effect a very great deal in preventing erosion and also in helping to*



reclaim denuded areas. Vegetation, as stated before, reduces evaporation by diminishing the wind action and by shading the soil. A good vegetal cover also helps considerably in binding the soil together. One may frequently observe the effect which a single plant root has in reducing the rate of growth of a small gully. Walk along any washed-out depression in the veld and you will almost certainly come across examples of this. Another beneficial result from a good cover of vegetation is the increase in moisture in the soil and later the increased supply of underground water which is the outcome of this. This is effected in two ways. First, there will be a large amount of root growth, and as each root affords a path down which the water can find its way below the ground surface, there will be a large area of entry. Secondly, the vegetation itself checks the flow of water, and thus increases the time of contact between the earth and the water flowing over it, thus enabling a greater amount of water to be absorbed.

The run-off from heavily grassed areas is always far less than from unprotected earth across which water rushes with uncontrolled force. It has been shown, in the Union of South Africa, that the moisture content of grassed soils may be as much as sixteen times the moisture content of similar soils which have suffered from erosion.

**Methods for Prevention and Reclamation.**—Having stated briefly how erosion takes place and what effects it has, it remains to be explained how it may be prevented and what measures must be adopted to reclaim eroded land. In the first place, it will be advisable to consider the land which is not being cropped annually, that is, pasture and unused veld land.

**Veld Burning and Bush Cutting.**—One is here faced with the ever-recurring question, “To burn or not to burn?” It can be stated that, with very few exceptions, it is definitely harmful to practise grass burning. Burning destroys the decayed or decaying vegetable matter which under natural conditions would form humus; it destroys the seeds of the finer grazing grasses, and in bush country it does incalculable harm to trees and bushes, which, although they may not be killed, will suffer from a retardation of growth. The sight of new green grass which appears after burning leads many

farmers astray in thinking that the growth is due to the burning. The new growth is present even if the grass is not burnt, and unless one is forced to burn in order to enable cattle to get at this new grass, because there is no other feed, there is no reasonable excuse for doing so. Grass burning has a direct deteriorating effect on the grazing value of the yeld. Paddocking will improve the vegetation, by permitting of easy rotation of grazing areas, and this should be resorted to. *Graze or cut the grass; do not burn it.*

As regards the bush cutting which goes on annually, here again the thoughtless person is joining forces with the warring armies of erosion. One admits that trees must be cut for fuel and buildings, but it is within the power of every farmer to reafforest such areas which have been denuded of trees. A progressive policy in afforestation will repay the individual handsomely in every case. The writer would like to see two trees planted for every one cut down.

**Over-stocking.**—Here is another “Don’t.” Over-stocking leads at once to over-grazing, which in its turn leads to soil erosion. The solution to over-grazing is paddocking, and the provision of adequate water supplies. If water supplies are few and far between, the cattle will over-graze the land in the immediate vicinity of the water. The water supply problem may be solved by boreholes, wells and dams, *but remember—the amount of underground water and the existence of perennial streams depend directly on the control of erosion.* If all the rain which falls on the land is permitted to rush off in the form of storm water, there will be no perennial streams, and the level of the underground water will drop to such an extent that obtaining underground supplies will become so expensive as to be beyond the means of the average farmer.

In paddocking, the paddocks should be so arranged that the movement of cattle from one grazing area to another can be effected along routes running in a direction transverse to the drainage slope of the country. Cattle tracks form an ever-ready source of gulley formation, and consequently must be watched, and their number reduced to a minimum. The planting of trees in paddocks will reduce erosion, and incidentally furnish shade for the cattle.



**Roads and Paths.**—The presence of good roads is hardly ever noticed on the farms in this country, and it is to be deplored that the farmer, as a rule, will not recognise their necessity. *Bad roads are a potential source of danger as regards soil erosion*, but this fact does not appear to enter the mind of our farming community. The writer is continually being asked how a gulley resulting from a badly drained road may be reclaimed. To administer a cure is not nearly so satisfactory as to give a preventative, and it is invariably more expensive. All roads must be properly drained if the farmer does not wish to be faced with the necessity of reclaiming dongas and gulleys; a camber must be given to the road surface, and, at the first appearance of wash, steps must be immediately taken to prevent further erosion.

The side drains along roads must be of such dimensions that all the water, which otherwise would flow on to the road from land above it, is carried away. The drain on the top-side of a road must necessarily be larger than that on the lower side, and the spoil must be deposited between the drain and the road, or else utilised in making up the road surface.

Suitable sizes of drains for roads may be taken from the table of sizes of storm drains given further on. On steep land, drains must be stepped down, and the steps protected against erosion by being constructed of brick, masonry or concrete.

Road drains must discharge at suitable points along their course, and advantage should be taken of all natural drainage channels for this purpose. If drains are discharged on to the veld, suitable places such as rocky outcrops and heavily bushed and grassed areas should be chosen as discharge points.

*(To be continued.)*





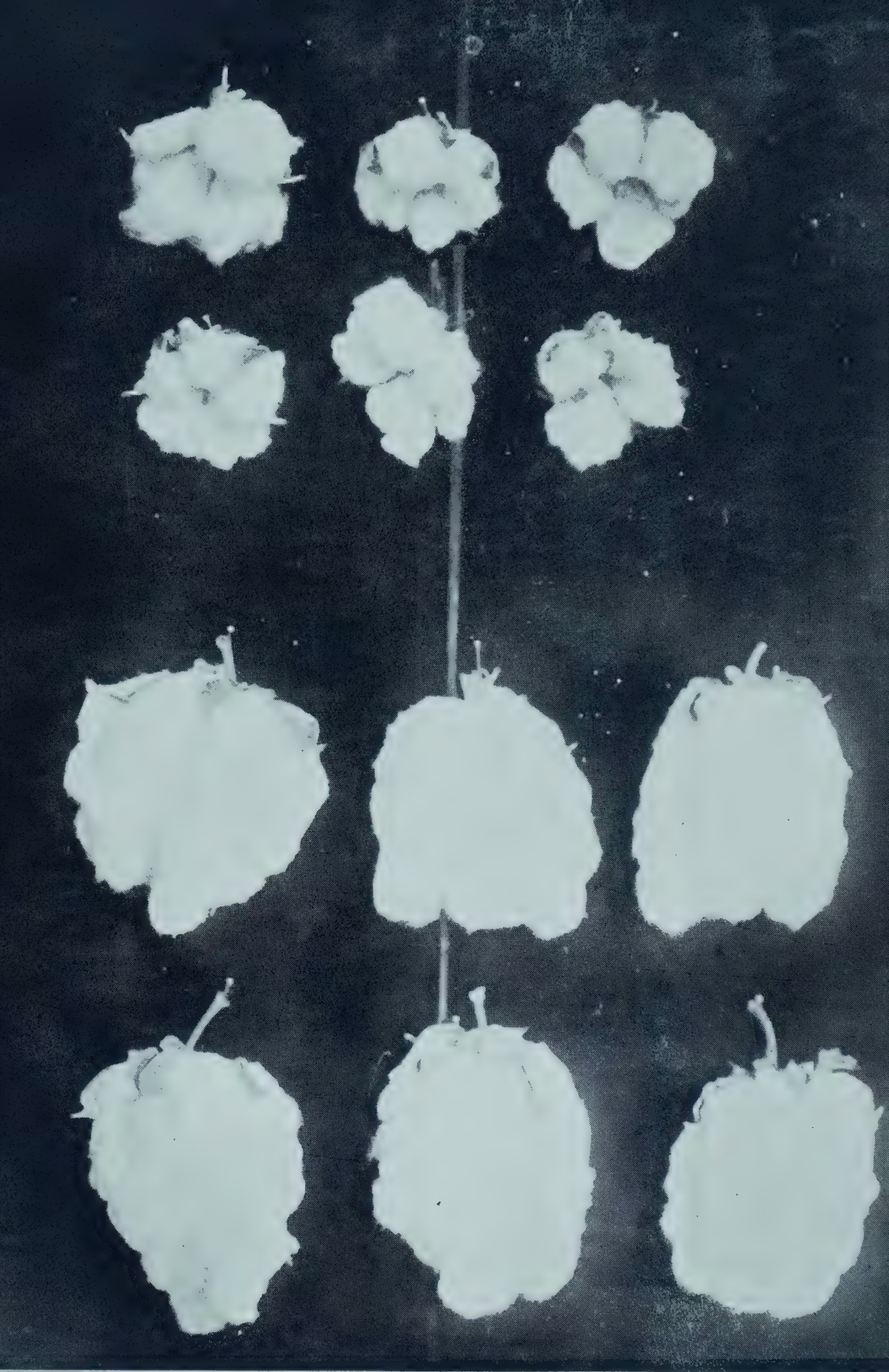


Plate I.

Top.—Badly opened bolls of Improved Bancroft cotton. Below.—Well opened bolls of Gambodia cotton. Gatooma Cotton Breeding Station, 1927-28.



# Cotton in Southern Rhodesia.

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## PROPAGATION OF U 4 SEED.

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By G. C. CAMERON, Empire Cotton Growing Corporation.

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Consequent on the large number of requests for jassid-resistant cotton seed which have been received during the last few months, the writer wishes to take the opportunity of explaining the position to readers of the *Rhodesia Agricultural Journal*.

About a year ago it became evident at the Cotton Breeding Station, Gatooma, that jassids (small sucking insects) were the principal cause of cotton failing to mature properly.

Many farmers, as well as others, were of the opinion that the weather was too cold in this Colony to permit of the cotton bolls opening as they should. That this was not the cause was proved at Gatooma by the behaviour of Cambodia cotton, which is highly resistant to jassid. Although a much later maturing cotton than Bancroft, Delfos, and other jassid-susceptible cottons, this particular variety kept on opening as late as July, when night temperatures were falling to near freezing point.

The accompanying photograph (Plate 1) clearly illustrates the difference of the manner in which the two varieties, Bancroft and Cambodia, opened. At the top are six average bolls of Improved Bancroft, while those underneath are Cambodia.

This difference in the behaviour of the two cottons gave a clear indication of what the trouble had been when cotton was tried previously, although it does not explain why the year 1923-24 produced fairly good yields throughout the Colony. It may have been that jassid was not so prevalent that year, but this is merely speculation.



Mr. Parnell, the Empire Cotton Growing Corporation's plant breeder, working at Barberton, showed very clearly, the previous season, that jassid was his chief trouble there, and proved his contention by a variety of very ingenious methods.

In his selection work he was also very successful, and it is one of his strains, known as U 4, which is being issued to selected farmers this year.

The U 4 strain, grown at Gatooma this year, looked so promising that it has been decided to bulk it up in order to have sufficient seed for general distribution next year.

About sixty farmers have been specially selected to grow U 4 cotton on an agreement whereby they sell 75 per cent. of the seed from their cotton crop to Government. This is as many as can be supplied with seed this year.

The seed has to be planted at fairly wide intervals in the row, and in order to economise seed it has to be planted by hand, using only two seeds per hole.

The Lomagundi, Hartley and Mazoe districts have been chosen as the principal areas in which to carry out bulking operations, but there is no idea of suggesting that these are the only, or the best, areas for cotton growing. Two multiplication plots are being grown in Matabeleland, and two on the high veld near Salisbury.

As it will be necessary to inspect these multiplication plots as frequently as possible, it will be readily understood why they have not been scattered over the whole Colony. Farmers in other districts are therefore asked to wait a further year, by which time it will be possible to judge the behaviour of the new strain under the varying conditions of the above-named districts.

While it is hoped that U 4 cotton will give a fair yield on most plots, it is only to be expected that there may be one or two failures, due possibly to unfavourable planting conditions or damage from bollworms.

Whether it does well or otherwise, it must be remembered that this constitutes the first issue of seed through the Cotton Breeding Station, Gatooma, and that those responsible for the above organisation are only making this issue in order to meet the urgent need of the Colony for a strain of cotton which holds out some promise of an adequate return.





Plate II.

U 4 plant defoliated to show heavy bearing character of the plant







Plate III.

U 4 strain of cotton grown at Gatooma Cotton Breeding Station, 1927-28.  
Re-selected plant from seed kindly given by Mr. F. R. Parnell of the  
Empire Cotton Growing Corporation.





The re-selection and bulking up of better strains is being actively pursued at Gatooma; to what extent can only be judged by those who take the trouble to go there and enquire for themselves.

If the season proves to be very wet, and U 4 cotton does well, we can look forward with confidence to better and better results as the improvement of strains goes on. To this work there is no limit, and farmers are asked to remember that heavy-yielding strains giving a high ginning percentage, combined with good length and regularity of staple, are not evolved in the course of a year or two, and rarely, if ever, discovered by accident.

Even if the U 4 does not come up to expectations, it is hoped that it will at least prove superior to any of the cottons which have been tried formerly. If not, the search will have to be continued with renewed effort. It behoves us, therefore, to keep a very watchful eye on the U 4 cotton, which will be on trial under field conditions during the approaching season.

There is every likelihood of seed vendors offering jassid-resistant cotton seed for sale in the future. No doubt they may be genuine, but there is always the possibility of any cotton seed being sold as jassid-resistant, and purchasers of such seed will have no redress in the event of their being defrauded.

Farmers will do well to wait for the results of U 4 in the forthcoming season, and in subsequent years purchase their seed entirely from crops grown within Southern Rhodesia.

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## Erratum.

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On page 1121 of the October issue of the *Rhodesia Agricultural Journal*, 17 lines from top of page, read "will not bury roots" instead of "will bury roots."



## Notes from the Entomological Laboratory.

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### TRAP CROPPING AGAINST MAIZE PESTS.

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By RUPERT W. JACK, Chief Entomologist.

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The use of trap crops for controlling plant pests is an old established practice, although the scope for its adoption is somewhat limited. In reference to maize pests under conditions in this Colony, a trap crop has undoubtedly a sphere of usefulness, particularly against maize borer (*Glottula fusca*), snout beetles (*Systates* and *Tanymecus*) and some other insects which eat the foliage of the young plant.

The trap crop in this instance consists merely of a limited number of rows of early planted maize, and its efficacy depends upon the trap obtaining a good start on the main crop. It is frequently necessary, therefore, to defer planting the main crop until December, in order to leave a sufficient interval after germination of the trap.

A point to bear in mind in planning the trap crop is that the soil needs to be fertile and in good tilth. Although the plants are foredoomed to destruction, it is to be realised that lack of vigour will seriously influence their attractiveness. It is therefore a bad procedure to plant the trap carelessly on the poorest available soil. Its growth should, in fact, be stimulated in every practical way, even to the extent of applying a forcing fertiliser or manure.

The ideal would be to distribute the rows as much as possible through the land to be planted later with maize, but the number of rows should be limited to what can be handled expeditiously when the time arrives for the destruction of the trap. Dr. Mally, in the South African Union, referring

to maize borer alone, suggests four rows run through the land at intervals of, say, 300 yards. If the land is not of too great extent, however, it might be more convenient, if this pest only is considered, to run the trap rows round near the edge of the land, so that removal could be effected with the minimum amount of labour and of trampling. With reference to snout beetles and leaf-eating pests, the best results are likely to be obtained from distributing the trap rows as regularly as is practicable through the lands. The trap rows can be ignored when planting the land, as the larger size of the plants will serve to distinguish them when the time arrives for their destruction.

The trap rows should in general be planted before the rains so as to ensure an early start, but November would appear to be sufficiently early. There is some doubt as to whether maize germinating in October is liable to as heavy attack as November plantings. Deep planting will help to protect the seeds in dry ground against insect pests.

Normally, volunteer maize has a strong attraction for maize pests, but is commonly insufficient in quantity as a trap for the borer.

In the event of snout beetles and other leaf-eating pests being present in the land, they will tend to concentrate on the trap and on volunteer maize. An examination of these plants before the main crop is planted may reveal the activities of such insects. If the attack is at all considerable, it is obviously a bad procedure to destroy the plants and leave the insects to transfer their attentions to the ensuing crop. Furthermore, even if the trap or volunteer maize is left standing, the crop will not be protected from the active insects.

By spraying the infested plants lightly with a poisoned bait, a large percentage of the snout beetles, crickets, etc., can be destroyed, and this is usually a practical procedure, especially if a pump of the "knapsack" pattern is available. The formula frequently tested against these insects is as follows:—

Arsenite of soda	...	...	...	1 lb.
Cheapest sugar	...	...	...	8 lbs.
or molasses	...	...	...	1-2 gals.
Water	...	...	...	10 gals.

The arsenite of soda, which dissolves rather slowly in cold water, can be dissolved rapidly in a little boiling water and then mixed with the sugar or molasses solution.\* Sugar has apparently a strong attraction for snout beetles, etc., and, in addition to the maize plants, it pays to apply the poison to any weeds, etc., on the land.

The drawback to using the above formula is that the plants are seriously injured or killed outright by the soluble arsenic, and the value of the trap in reference to maize borer will largely be lost. This might possibly be avoided by using arsenate of lead in place of arsenite of soda, but arsenate of lead is a much slower poison and is much more expensive. It has also not been properly tested against snout beetles. Its use cannot, therefore, be recommended. The point to bear in mind is that if the trap is heavily attacked by snout beetles, considerable damage to the main crop is a practical certainty, unless the insects can be destroyed. Subsequent loss from borer is not certain, and indeed is unlikely to be serious if December planting is practised. Under the circumstances, therefore, the trap may well be sacrificed in order to deal with the beetles.

For the trap crop to fulfil its object against maize borer, it is absolutely necessary that it be destroyed, and at the right time. It should not be destroyed before the egg-laying period of the November-December brood is approximately over, but should be destroyed as early as possible after, in order to avoid migration of the borers to surrounding plants. It has been recommended that the traps should be left until the borer larvæ are changing into pupæ. This recommendation appears to leave the migratory habit of the borers out of consideration, although this habit is well known. On account of this habit, whether a trap crop is resorted to or not, volunteer plants should be removed from the maize land and destroyed before the borers, which they are likely to contain, can infest surrounding plants.

Records in this Colony, referring chiefly to the Salisbury district, indicate that egg-laying is for the time being practically over the second week in December. After that

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\*Arsenite of soda can be purchased already in solution in water, and must, of course, be used according to the strength of the solution.



date retention of the trap would probably do little or no good and migration from the crowded plants is likely to occur before long. The 15th December, therefore, appears indicated as about the date for destruction of traps and volunteers, but if any signs of migration are noticed, or if the plants are very heavily infested, they may be destroyed as early as 10th December.

At this time of year the young maize plants are little relished by stock for food, and it appears only necessary to remove the plants from the field for a distance of several hundred yards. If they can be added to the manure pit, so much the better. The young borers will not mature in the withering plants. Complete and immediate removal from the land after pulling is, however, essential. The plants should not be left lying in the midst of the crop for even a few hours.

The idea behind the trap and the action of volunteer maize in attracting borers is not so much presence of food for the borers in the absence of other food, as presence of larger plants. It is a well-established fact that the female moths of the November-December brood are attracted to lay on the more forward plants. In the case of the brood which occurs in February, the more backward plants are favoured. This is one of the reasons why January plantings are frequently swamped by borer, the February brood being as a rule a very much larger one than that which occurs in the spring. Concentrated on a limited piece of land, its effect may be devastating.

On account of this tendency of the February brood to concentrate on backward maize, late plantings for silage commonly serve as an excellent trap for the borers, which are in due course destroyed in the silo. Such crops may, therefore, help to reduce the number of borers which might otherwise survive to attack the next season's crop.

## Pasture Improvement in Rhodesia.

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*[We feel sure that the subjoined extract from the report of the Empire Marketing Board for the year May, 1927, to May, 1928, will be read with great interest. It will be remembered that we published an article in the September issue of the Journal by the Chief Chemist, in the course of which he described an experiment carried out at the Agricultural Experiment Station, Salisbury, last season, to determine whether the application of a fertiliser containing the whole three essential ingredients would exercise any immediate effect on the protein and mineral composition of the growing grass. He explained that this information was desired in order to assist in drawing up a plan for pasture improvement by fertilisation which it is hoped to carry out on a fairly extensive scale. Readers will be pleased to note that the Empire Marketing Board has now agreed to make a grant for this work, and that this Colony is to participate in this Empire scheme of pasture improvement. We are not yet in a position to publish any details as to the manner in which the work is to be carried out, but we understand that a start will be made this coming season, and we hope to publish some details in a subsequent issue.—Ed., R.A.J.]*

“Pasture, to the average man, means little more than an imperfectly disciplined array of herbage. Yet it has lately been calculated that Great Britain consumes each year products of grasslands—meat and dairy produce, wool, hides, etc.—to the value of £426,000,000. If strictly that figure needs the qualification that not all the foods and raw materials taken into account are the produce of grass consumption alone, yet the bulk of the grassland products remains sufficiently striking.

“Last year’s report spoke of the research work then being started into the problems of the mineral deficiencies of pastures, with the Rowett Research Institute, Aberdeen, as their base. These investigations have progressed and have been extended. They are now being prosecuted in



Australia, where the Waite Agricultural Research Institute of Adelaide University is conducting work financed partly out of its own resources, supplemented by the generosity of private Australian citizens, partly by the Commonwealth Council of Scientific and Industrial Research, and partly by the Empire Marketing Fund; in New Zealand, where work is being conducted in the Chemical Laboratory of the Department of Agriculture at Wellington and at the Cawthron Institute; and in Kenya, where tests have been conducted at three different centres. A grant has lately been approved for the extension of the research to Southern Rhodesia; and it is hoped that it may be found possible to co-operate still more fully in this line with the Government of the Union of South Africa, to whose Institute at Onderstepoort the Empire owes so much for its pioneer work in this field. Mention may also be made here of an interesting experiment in calf-rearing in Palestine, conducted during the year in consultation with the Rowett Research Institute and at the joint charges of the Zionist Organisation and the Empire Marketing Fund. This experiment showed that calves could be reared in Palestine much more economically than is possible by the methods hitherto locally accepted. A demonstration of its successful results, held at Herzlia and Afule in March, attracted a good deal of local attention.

“Another aspect of pasture research has also come before the Board this year. It was approached by the Welsh Plant Breeding Station and by the New Zealand Department of Scientific and Industrial Research for assistance in the prosecution of concerted research into the breeding of herbage plants. There is no space in this Report to do more than indicate the scope of these proposals. The history of the migrations of the grasses would in itself make a fascinating book. There are grasses, such as Italian rye-grass and cocksfoot, which have been deliberately taken from Europe to the Southern Hemisphere. There are grasses, such as the subterranean and suckling clovers, which, accidentally introduced into the Southern Hemisphere, have there taken on a value greater even than they possessed in their older home. There are other grasses, such as Wallaby grass and its allies, which, though native and valuable in the Southern Hemisphere, are of no apparent value in Britain.



• “If the pasture lands of the Empire are to be put to their best uses—if indeed the deterioration of pastures, which is already disclosing itself in many parts of the Empire, is to be stayed—research work and trials on the grasses are just as urgent as, for instance, on the wheats. They are needed to select the best and most long-lived strain of each grass, to determine the conditions in which they should be cultivated, and to indicate what countries of the Empire are best fitted to grow the supplies of seed required by other Empire countries. A grant has been made to the Aberystwyth Station for the commencement of a programme of work directed to these ends; and a contribution has been made to the New Zealand Department towards the cost of the establishment of a Plant Breeding and Seed Research Station.

“Meanwhile the Board has caused a study to be made by Mr. A. N. Duckham\* of the various existing methods of drying pasture grass in ways which ensure the preservation of its nutritional qualities and enable it to be readily transported. The report of this enquiry has lately been published.”

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## Maize and Nuts.

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With the sincere hope that my experiences may be of some use or guide to those who in the future have to look to the humble mealie for at least part of their living, I have been persuaded to write the following notes.

For the past three years, on 200 acres of land, on a comparatively new farm, I have reaped an average of 16 bags of maize per acre. The land in question may possibly be a little above the average quality of that in the Mazoe valley, but includes forty acres from which only six bags per acre were reaped in the first year of the period referred to. This latter area has, however, during the last season, with a

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\* Grass and Fodder Crop Conservation in Transportable Form (H.M. Stationery Office: 1s. 2d. post free).

rainfall of 27 inches, given a return of over 15 bags per acre, in spite of a drought of a month in January-February.

All the area under maize has received 200 lbs. of bone and super per acre during the three years, and has grown either ground nuts or cotton in rotation with the maize; the poor area referred to above having grown cotton with fertiliser, and bone and super before the following maize crop.

As regards rotations, I have found that maize after nuts, provided fertiliser is added for the maize, has been very successful, giving at least two bags per acre more as against maize after maize, and in this connection, if it has not already been tried on the Gwebi farm, I should be glad to see it done there and the result published.

Cotton, which we all hope to see come into its own again very soon, has also proved a most valuable rotation crop with maize, its long tap root apparently making available more plant food by acting as a sub-soiler.

The area planted to nuts of the total extent mentioned above, has been approximately 50 acres each year, with an average return of 22 bags per acre. For the guidance of the new settler or maize grower, it should be borne in mind that the nut crop is available for sale at a time of the year when most farmers are very pleased to be in a position to obtain a little cash, viz., April-May.

The farming methods followed are just the old ones thoroughly supervised. On coming to this country I did rather wonder whether, because the seed of maize was large, it was thought unnecessary to work up the land into the same fine order that is necessary in the old country, where all seed planted is considerably smaller. I quickly discovered, however, that exposed maize seed was very soon rendered useless by the work of the dust beetle, etc., and consequently kept down my area under maize with the object of having a good seed bed. I have proved too that this assists to a very great degree in times of drought, for with a good top mulch excessive cracking of the ground is reduced very considerably, and consequently moisture is conserved.

The land has always been well ploughed, and where the first ploughing has not been too satisfactory, cross ploughing has been resorted to. The land has also been well disc

harrowed, and before planting spring tooth harrows have been well used, it having been found that by setting these deep, much more effective work has resulted than by the original method of drag harrowing. The whole area has been kept well cultivated after planting, and weeds reduced to a minimum.

I have been very impressed with the large areas under cultivation by individual farmers in this country, and have been very interested too in the results of green manuring, which I also started last season, and so hope to have my own results this season.

After having had experience in the old country, where heavy dressings of farmyard or fish manure used to be given every year, in addition to rotation being carried out, one is inclined to doubt whether the farmer who states that he has grown maize on certain lands for 15 years or more is to be complimented, or has given much consideration to the future.

In this country too, with the heavy storms, a good deal of thought seems necessary with regard to soil erosion. I have this season appreciated the very excellent service given by the Department of Agriculture in having available a most efficient irrigation branch, and have obtained advice on the best manner in which to protect my arable land, appreciating that the best of the ground is the first to be washed away.

Finally, to the new grower, and with all due respect to some of the older ones, I would suggest that too much care cannot be devoted to seeing that the planters are in good working order; new runners for the latter are rather expensive, but they are very essential.

“HOPEFUL.”



## Check-row Planting of Maize.

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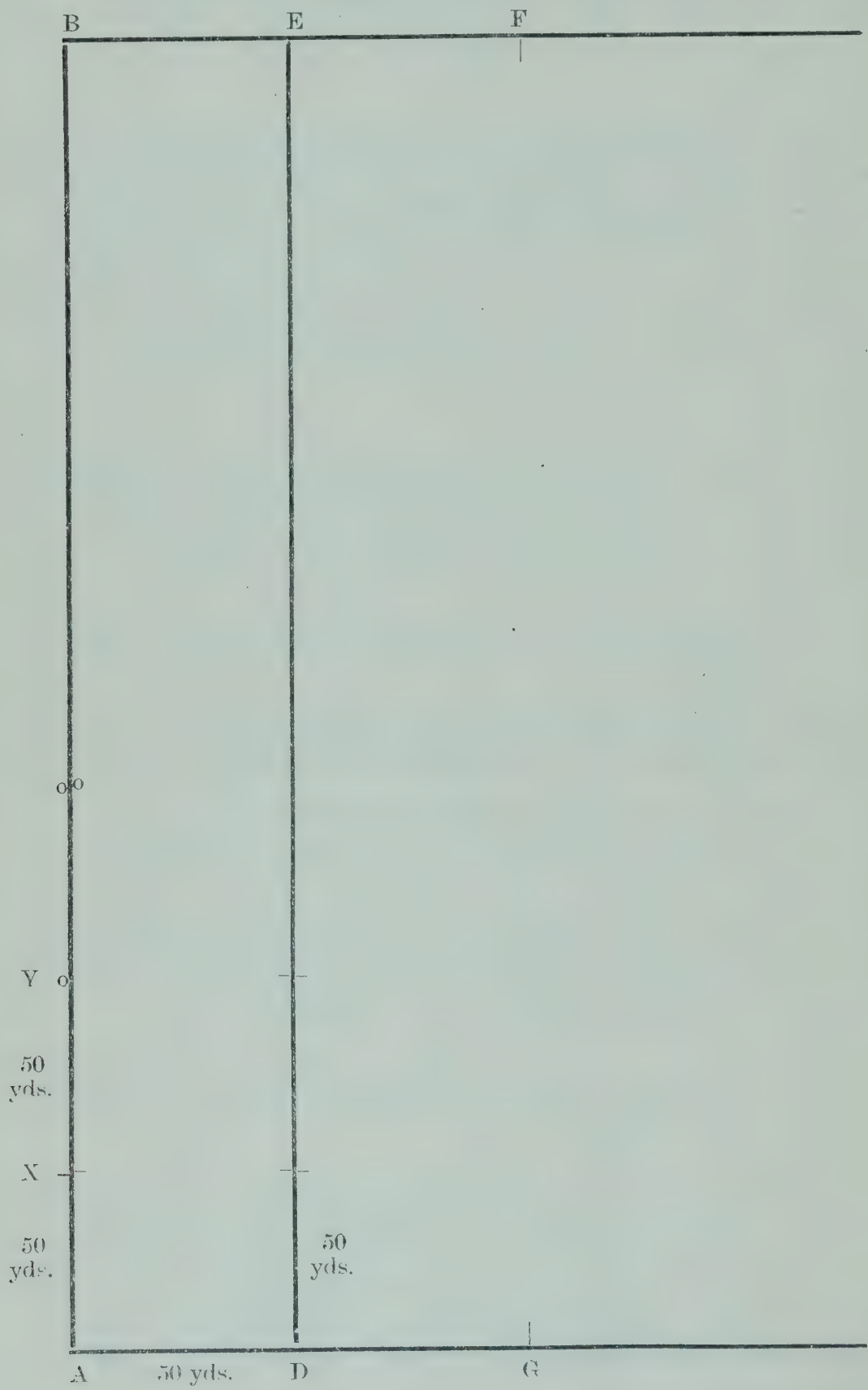
*[The following reply, given by the Chief Agriculturist to an enquiry, is published as being of general interest. It may be that the system described below is not the best that can be devised. We shall be glad to receive for publication particulars of any other which has been effective. The description of the method employed should include information concerning the amount of work done per native per day.—Ed., R.A.J.]*

In this Colony only a very small proportion of the land under maize is planted by hand on the check-row system. The following are the principal arguments in favour of this method:—

- (1) Comparative certainty of obtaining a full “stand” of plants.
- (2) Enabling early planting, as the holes for the seed may be opened and prepared before the rains arrive.
- (3) A bad tilth precluding good work being done by a machine planter is not an obstacle to hand planting.
- (4) The ability to use “butt” and “tip” maize grains from cobs selected for “seed” which, owing to uneven size, are unsuitable for planting with a machine, and would, therefore, be wasted as “seed.”
- (5) Ability to cross-cultivate and so clean weeds thoroughly from dirty lands without resorting to hand hoeing.
- (6) The desire or need to employ a surplus of labour usefully in the off-season before planting season arrives.

The method of check-row planting described below may be employed on lands of any size. The attached rough diagram should be referred to when reading the following description.

ROUGH DIAGRAM TO EXPLAIN METHOD OF  
CHECK-ROW PLANTING MAIZE.



Planting chains are first prepared of stout galvanised wire, marked at 3 feet intervals by "knots" of wire twisted on to the chain. They should be about 54 yards long, as this is a convenient length for handling.

Starting from one corner of the field A, two lines are laid out at right angles to each other by placing sticks in the ground at points X and D, 50 yards from A. A planting chain is laid along AX, and holes are made with a hoe opposite the knots at 3 feet intervals along this to X. Other sticks are planted at distances of 50 yards apart along XB, until B is reached, and by using the chain and hoe the 3 feet distances in between are marked out as before.

At B, a line BF is laid out at right angles to AB, with sticks at 50 yards intervals at E and F. The line ED is then marked out at 3 feet intervals as in the case of AB described above. When D is reached, the process is repeated on the line CF, and so the whole field is marked out in parallel lines, which are themselves marked out with holes along their length at 3 feet intervals.

Up to this point the work must, obviously, be supervised by European labour. Then boys with other planting chains, also knotted at 3 feet intervals, lay these chains across AB and DE and DE and GF, and so on, and commencing, say, at AD and DG. In similar manner the whole field is marked off.

If planting proper is to follow at once, a gang of boys is lined up at AD, and may consist of any number, say 6 upwards. The length of row to be planted by each boy is marked on the planting chain by tying on pieces of limbo, to mark the number of holes each boy has to dig. Each boy carries a bag of "seed" slung over his shoulder and a badza or native hoe. He digs the requisite holes, places 4 grains of seed a small distance apart from each in each hole, covers the seed over, and when the row is completed the line is moved forward, until in this way the whole strip is planted.

Other gangs of boys, of course, may be employed in planting other strips at the same time. Two boys, one at each end, are required to hold and set the planting lines, which should be attached to two stakes, about 6 inches from the bottom.



## The Application of Fertilisers in Southern Rhodesia.

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### BROADCASTING *VERSUS* DRILLING.

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By J. V. DANCKWERTS, African Explosives and Industries, Ltd.

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*[Apropos of this article, which we consider to be of sufficient general interest for publication in this Journal, we may state that experiments are being carried out at the Government farm, Gwebi, to test the relative effectiveness of applying fertiliser to the maize crop with a fertiliser attachment, as against distributing it broadcast with a fertiliser distributor.—Ed., R.A.J.]*

Now that the practice of fertilising maize has become general throughout Southern Rhodesia, it seems a fitting time to discuss methods of application. The two most popular methods practised in this Colony are drilling the fertiliser in the row by means of an attachment on the maize planter and broadcasting, either by hand or by machinery.

Most planter attachments, when the fertiliser is in good physical condition, do all that is asked of them. The chief difficulty, however, is that they are apt to clog or break down and waste precious time when it can ill be spared. Unfortunately, it is impossible for some fertilisers to be kept dry and in good pouring condition. Superphosphate, for instance, due to its hygroscopic nature, absorbs moisture from the atmosphere and becomes sticky, necessitating frequent stoppages to enable the attachments to be cleared. This difficulty is minimised when a proportion of bone meal or rock phosphate is added to the superphosphate. An important point to remember when putting concentrated mixed fertilisers (*i.e.*,

mixtures containing nitrogen and potash as well as phosphoric oxide) through an attachment is that the germination of maize seed is sometimes adversely affected by applying fertiliser too close to, or in direct contact with the seed. Straight superphosphate is less liable to affect germination than a compound mixture. In a dry season a concentrated fertiliser coming into direct contact with the kernel is able to draw out the moisture. This naturally has a detrimental effect on germination. A wet season would, of course, dilute the fertiliser and render it harmless.

When purchasing fertiliser attachments, farmers would be wise to insist upon machines which drop the fertiliser at least an inch or two from the seed, or at any rate form a layer of soil between the fertiliser and seed.

Broadcasting is becoming more and more popular. Its advantages, in addition to safeguarding germination, are many. Straight fertilisers and bone super mixtures which contain only a small percentage of organic nitrogen can be spread during the winter months and disced or ploughed into the soil. Care should be taken not to turn fertilisers under too deeply; a depth of 5 or 6 inches will be found most suitable. This method enables a farmer to concentrate on planting when the time comes and so materially speed up the work. It has been found that broadcasting and turning fertilisers under will encourage roots to strike deeply and so tend to make the crop more drought-resistant.

Broadcasting is often done by hand; but this is a laborious method, and should only be done on calm days. Moreover, natives can seldom be trained to distribute accurately a given quantity per acre. A far more satisfactory method is the two-wheeled hopper type of fertiliser distributor. The average model holds about 400 pounds of fertiliser, gives an even and accurate distribution, and does away with a tremendous amount of handling. In machines of this kind the more simple the mechanism the better, as fewer working parts mean less clogging, fewer stoppages, also a lower cost of maintenance.

Many farmers have the idea that when fertiliser is broadcast it is not so readily utilised by the plant. In the initial stages of growth it naturally follows that the roots will not come into contact with as much fertiliser as they would in

the case of a localised application; but the root system of a maize plant is such that in the course of seven or eight weeks the roots extend not only deep into the soil, but horizontally in every direction, completely underlying the surface and filling the soil below the cultivated layer, thus sending up to the plant a continuous and steady supply of plant food.

Some farmers deprecate broadcasting on account of the extra growth of weeds; but as weeds, like any other plants, respond to a dressing of fertiliser, we can only remind these gentlemen of the old saw, "Good farming is clean farming."

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## A Farmer and his Soil.

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By HUGH PYE, Principal, Dookie Agricultural College,  
in *The Australasian*.

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Farmer: "Well, Soil, what are you really made of? I sometimes think I know a good deal of you, but when I consider my returns from you during the last few seasons, I must admit that I should like to become better acquainted, for, without doubt, my wealth and prosperity depend much on your moods and generosity."

Soil: "My dear Farmer, I shall be delighted to enlighten you in regard to my origin and future aims, since we are so intimately connected in respect to mutual progress that I would be indeed ungenerous did I not accede to your very pertinent request. Do you see those hills to the north? Well, strange to say, I was at one time a part of them. I was actually a hard rock; and before that formed the hot molten lava from a volcano. Then I cooled down and became a rock; but being tired of always remaining useless, I invited the air, the frosts, and low forms of plant life to settle on me and reduce me into fine, loose grains that the rain and the wind would carry into lower levels. If you



ask me how the air could reduce me to such fine particles, I will tell you. As you are aware, the air is made up of oxygen, nitrogen, and carbonic dioxide. Now the oxygen used to act on the iron that was in me, and on some of the other minerals. Then the iron would become rust, or what chemists would call oxide of iron, a compound of iron and oxygen, and you know in that form the least rub would wear some of it away. There was also another mineral in me called felspar, and the carbonic acid gas and water would act on it, and reduce it to clay, or silicate of alumina, as chemists call it, also compounds containing lime, soda, and potash, some of which dissolved in the water. Really I could hardly imagine that these weak things could reduce me so fine—they took so long over it, I believe thousands and thousands of years, but here I am at your service.”

Farmer: “But there is more in you than clay and compounds of lime, soda, potash, and iron oxides.”

Soil: “Certainly, Mr. Farmer. I felt that I would like more, so do you see those hills to the west? Of course you do. Well, they are composed of sandstone or particles of sand bound together by cements that are easily acted upon by the air, and in some cases moisture soaks in, and when it freezes breaks off pieces, or loosens the little particles from each other, and these are washed down in order to join me. Of course, these limestone rocks to the south also send their share of fine particles, and it accounts for your cattle grazing on the grass growing on me being so healthy, strong and fat, especially when you first bought me.”

Farmer: “Suppose that you were only formed from one kind of rock, would you be as useful to me?”

Soil: “No, Farmer, I would not be, generally speaking, yet if I were formed from basalt rocks I would be very good, as I would then have stored up within me food that your crops and grass thrive on, provided that I have sufficient rain to drink for the plants. If, however, I was formed from sandstone only, I would be a poor soil, and would not grow good crops, and only poor grasses would cover me, which would not be of much service to you. In fact, your stock would degenerate if reared on the plants growing on me then, as I would not contain sufficient flesh and bone forming material, so, of course, the grass could not get any, and con-

sequently the animals that eat the grass could not either, and so when they grow up they would be poor, rickety-looking things."

Farmer: "Then of what use is the sand, the clay, and vegetable matter?"

Soil: "These are all useful to me, Mr. Farmer, both mechanically and indirectly, as food for your crops."

Farmer: "I do not quite understand you when you say these substances are useful to you mechanically, and I would like to know more about their food-supply properties, if you would kindly tell me."

Soil: "Certainly. In reply to your first enquiry, I might ask you, Mr. Farmer, whether it is easier to dig a sandy soil, or a clayey one? Naturally from your experience you would say that it is much easier to dig the former soil, and very difficult to dig a very clayey soil, hence the amount of work you expend on me will depend a good deal on the relative amounts of sand and clay present, and this is partly what I mean by saying that clay and sand are useful to me from a mechanical point of view. Each helps the other; thus, when there is a fair quantity of sand present in clay it makes the soil easily worked, and it allows the surplus water to drain away quicker and not smother the roots, for the roots will be actually drowned for want of air if they have too much moisture, and this they would have in a district having a good rainfall where the soil is composed of heavy clay, for clay has certain properties, called physical properties, or properties pertaining to the structure of this substance, and an important one is its power of absorbing and retaining moisture. It fortunately has the power of absorbing ammonia also. If it absorbs much moisture it is so difficult to work that when I contain much of it, Mr. Farmer, you have either to leave me alone or get a very strong team of horses to plough me and then you do not make a good job of me."

Farmer: "That is so, Soil. Will you not tell me how I may overcome the difficulty?"

Soil: "Yes, Farmer, I will. I said a little time ago that if there was much sand mixed with me I would gradually become more amenable, but as I could not expect you to expend much time in carting all the sand needed, I will tell



you a simpler and more practical method. Go to the lime kilns, or to the sea shore, where there are tons of small shells, or to the marl pits, and cart about five or ten tons to the acre, or even more in some cases; spread this over my surface and plough it in. In the course of time I will become more friable and more easily ploughed and cultivated, and better grass will also grow on me."

Farmer: "What about the lime? I am too far from the sea or marl pits."

Soil: "Well, Farmer, ask the Railway Commissioner that question. I am afraid it is not worth the money after the present freightage has been paid. In New South Wales lime is carried long distances at low rates, and, besides, it is bought very cheaply for the purpose we are discussing."

Farmer: "How does the lime act on the clay, Soil, that it makes it so much easier to cultivate?"

Soil: "Clay is a compound of silicates of alumina and of other substances. It is often coloured with oxides of iron, of which common rust is an example. One of these silicates of alumina is present in exceedingly small quantities, and, in fact, it is scarcely noticeable; yet it is this that makes the clay soil so difficult to work, when it absorbs water it swells like glue does, and, strangely, if a tank is formed in it, the water that runs into the tank does not then soak out readily. The lime when applied to the clay has the power of making this jelly-like part of the clay shrink or coagulate, and in doing so the clay loses its power of holding water, and becomes more friable or grainy, and not so difficult to work. For the same reason the presence of lime in dam water renders it clear."

Farmer: "Will you now tell me something of the non-mineral or organic matter in you, Soil?"

Soil: "With pleasure. I presume you refer principally to humus or decomposed vegetable matter?"

Farmer: "Yes, Soil; and perhaps you may include those exceedingly small living plants called bacteria in your reply."

Soil: "Commencing with humus, it being the more important organic constituent in me, I might say that it is simply vegetable matter that has rotted away to a light,



black, spongy substance, which has important physical and chemical properties. It is a good absorbent for moisture and heat, it gives a dark colour to soils, and is especially useful in sandy soils in order to bind the particles together and make them retain moisture. There is much to learn in regard to the chemistry of humus. It contains compounds containing nitrogen for the use of plants, and when it decomposes weak acids are formed that act on the minerals of which I am made up, and so more soluble plant food is made available. Most of our wheat fields are deficient in it, which accounts in some respects for poor crops. It will be seen that the amount of humus in me is not constant; the carbon unites with the oxygen to form carbonic dioxide, and the nitrogenous matter ultimately becomes a nitrate salt by a process called nitrification, due to low-plant organisms termed bacteria working under favourable conditions. Then there are other germs that, to some extent, are supposed to undo the work of the latter, and these are called the denitrifying germs. There is much to learn about these still, and scientists are studying them very closely at present."

Farmer: "In what way do you prefer water?"

Soil: "Simply as a thin film around each particle of soil. This gives the air an opportunity of passing into me, or rather through the very fine spaces between each particle, in order to keep me sweet, and promote chemical action. The air in me contains a good deal of carbonic dioxide, due to the oxidising of the organic matter present, and with the moisture, dissolves more plant food from the particles forming me."

Farmer: "I thank you for your chat about yourself, and trust that I shall have a few more questions to ask you in which the information you have given me may be practically demonstrated."

Soil: "I shall be very pleased to reply to your requests at any time in order that our mutual interests may be fostered. The fact is, I act as the farmer's bank, and, although I do not mind allowing an occasional overdraft, I can scarcely give credit to those who persist in taking all out of me they can without repayment in any shape or form. They must study me or sooner or later I will not respond to their entreaties for remunerative crops."

## Chinchilla and Angora Rabbits.

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The following note on the present position and prospects of the market for Chinchilla rabbit skins and for Angora rabbit wool in the United Kingdom, has been prepared by the Imperial Institute, and is published for the information of those interested.

**Chinchilla Rabbits.**—The rearing of Chinchilla rabbits is usually carried on only as a side line to other farming activities. It has an advantage in only requiring a small capital and gives a quick return; but, on the other hand, the rabbits require continuous attention in respect of breeding, feeding, etc., if skins of high quality are to be produced.

The question of the production of Chinchilla rabbit skins in the overseas Empire was discussed at a recent meeting of the Imperial Institute Advisory Committee on hides and skins. It was considered to be somewhat doubtful, in view of the prices obtainable in London at the moment, whether the shipment of the skins to the United Kingdom will prove to be remunerative. It is understood that dressed and pulled skins were recently being offered in London at from 7s. 6d. to 8s. each, less 6 per cent. discount. The skins would probably be more readily saleable in the raw (undressed) state, but the value of such skins might not be more than 4s. to 5s. each, especially when (as at the present time) the demand is not good.

If it is decided to take up the breeding of Chinchilla rabbits in Southern Rhodesia, the best plan would probably be to send over small lots (say two or three dozen) of the undressed skins as they become available, packed in naphthalene powder, rather than waiting for a large parcel to accumulate.

As regards the disposal of the skins, large consignments could be sent to brokers for sale by auction, but small parcels might be sold through the medium of a fur merchant.

Messrs. Culverwell, Brooks & Co., of 59, Mark Lane, London, E.C. 3, one of the largest firms of hides and skins brokers in London, have given the Imperial Institute the name of G. G. Gherardi, 176-178, Upper Thames Street, London, E.C. 4, as a reliable firm of fur merchants specially interested in Chinchilla rabbit skins. In the first instance, however, it might be advisable to communicate with Messrs. Culverwell, Brooks & Co., stating the quantity available, and enquiring as to the exact market requirements.

The following firms of fur merchants and brokers in London are also understood to be interested in Chinchilla rabbit skins:—

C. W. Martin & Sons, Ltd.,  
68, Upper Thames Street,  
London, E.C. 4.

T. G. Richardson,  
38, Queen Street,  
London, E.C. 4.

C. M. Lampson & Co.,  
64, Queen Street,  
London, E.C. 4.

Goard, Rigg & Co. (Brokers),  
10, Mark Lane,  
London, E.C. 3.

**Angora Rabbits.**—The rearing of Angora rabbits for the production of “wool” is one of the profitable small industries of France, and has also been taken up to some extent in the United Kingdom, chiefly as a part-time occupation. There is a good demand for the wool, which at the present time is valued at about 20s. to 30s. per lb. according to quality.

The production of wool in the United Kingdom is comparatively small, the wool being generally collected by an organisation of the breeders, which sends consignments to the spinners at regular intervals. It is understood that English buyers will not take quantities of less than 1 cwt. The manufacturers prefer the wool to be as long as possible, and attach much more importance to this character than to the fineness of the staple. The highest prices are obtained for white wool, but as the black rabbits carry a heavier coat,



there is little to choose between the monetary returns yielded by each kind.

The two principal firms of spinners in the United Kingdom using Angora rabbit wool have been consulted by the Imperial Institute as to the demand and market prospects for the material.

Messrs. Derwent Mills, Ltd., Matlock, state that at the present time the market is somewhat depressed, but that there are indications that the demand may revive in the near future. They quote the present market price for superfine English types of wool at 34s. per lb., with first grade Continental type at about 25s. per lb., and other qualities in proportion. The other firm of spinners (Messrs. Angora Yarns, Ltd., 31, Sunridge Road, Bradford) report that at present the prices of Angora wool are very low, but that it is hoped that in the near future a stabilised figure of about 30s. per lb. will be reached for first quality wool. They state that there are many enquiries for the material, and that a number of experiments are being made in connection with its use. The firm add that in their opinion larger quantities of wool will be required eventually, and that as the weight of wool which is being grown at the present time is very limited, there are good prospects for the marketing of an increased production.

Should supplies of the wool be available in commercial quantities in Southern Rhodesia, it is suggested that the firms mentioned above should be consulted regarding their disposal. Messrs. Goard, Rigg & Co. (Brokers), 10, Mark Lane, London, E.C. 3, might also be communicated with in this connection.

## Twelve Simple Rules

RECOMMENDED TO BE PRACTISED FOR THE  
AVOIDANCE OF MALARIA AND BLACKWATER.

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1. See that no collections of water are allowed to remain near the house, and that all hollows in the ground or in the stumps of trees or irregularities in roof-gutters are filled in or repaired, and that water is given no means of collecting after rain, for in such collections of water mosquitoes breed.

2. See that the house is well removed from streams, vleis or marshes, irrigation furrows, dams, duck ponds and artificial collections of water—the distance being, where possible, at least half-a-mile—for in these mosquitoes breed.

3. See that all rain-water tanks and receptacles where water is stored for household use are protected at all openings with mosquito-proof gauze, for in these mosquitoes breed.

4. See that all long grass, bush and scrub are kept cut and cleared round the house for at least 200 yards, for in these mosquitoes shelter.

5. See that all the rooms are painted in light colours or whitewashed, and thatched roofs ceiled with white calico, for mosquitoes prefer dark surfaces to rest on and light colours tend to repel them. Moreover, on light surfaces they can easily be seen.

6. See that all doors and windows are screened with mosquito-proof gauze. With a little ingenuity and the outlay of a few shillings this can easily be fixed to the openings in wattle-and-daub houses or circular huts, as well as to brick or wood-and-iron buildings. By this means the mosquito is prevented from biting you.

7. Always have mosquito-screened doors fitted with springs, opening outwards, so that they close of themselves, and always see that these doors are kept shut, and that the mosquito gauze on them and on the windows is in repair.

8. Always sleep under a mosquito net, for the mosquito bites most at night, when it is dark and you are quietly in bed and asleep, and even with screened doors and windows one or two mosquitoes may get in and bite you.

9. See that the huts and sleeping quarters of the native farm servants are at least a quarter of a mile from your house, for natives almost always harbour the parasites which cause malaria, and from them the mosquito largely draws the parasite, which it passes on to you.

10. Never forget that persons who are suffering from malaria, or who have recently recovered from an attack, are a source of danger to others, for they contain the parasite in their blood, which the mosquito draws from them when it bites them and sucks their blood, and which it passes on to you.

11. Always take 5 grains of quinine every evening, so that the parasite may be prevented from multiplying in your blood. Small doses of quinine such as this, taken regularly, will do you no harm.

12. Never forget that malaria and blackwater are the result of infection by a little parasite which is passed into your blood through the proboscis of the *Anopheles* mosquito when it bites you. Therefore, in order to avoid malaria and blackwater, you must firstly attack the mosquito by destroying or removing the places where it breeds and shelters; secondly, you must protect yourself from being bitten by living in a mosquito-proof house and using a mosquito net; and, thirdly, you must prevent the parasite multiplying in your blood by taking quinine.

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### FOR SALE.

Middle White Pigs.

Apply Department of Agriculture, Salisbury.



## Maize and its Utilisation.

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The following extracts have been taken from the supplement to *George Broomhall's Corn Trade News* of the 14th August, 1928:—

### WORLD'S CONSUMPTION OF IMPORTED MAIZE.

During recent weeks we have been making enquiries regarding the purposes for which maize is used in the several large importing countries. We were prompted to initiate the enquiry by the concern created owing to reports that the swine population had begun to decrease again after the recent rapid increase noted in these columns, which it was feared would seriously curtail the demand for the large quantities of maize which are being shipped week by week from Argentina.

During the past year or two the demand for maize in Europe has been growing by leaps and bounds, partly owing, it is said, to the loss of the usual large supply of Russian barley, which formerly came so regularly and was so much appreciated by pig breeders in most European countries, and partly to the shortage last year of other fodder crops. But these causes seem hardly sufficient to account fully for the increased demand for maize during the past years, as the supply of imported barley has, in reality, become quite substantial again in spite of Russia's abstention as a shipper, the total supplied by other countries during this and last season having amounted to no less than 16,000,000 qrs., compared with about 6,000,000 qrs. per annum five years ago. Taking a broad view, it can safely be said that the demand for feeding stuffs generally is again increasing steadily year by year, though it is still a good deal less than it was in pre-war days.

Going back to the seasons 1919 and 1920, we notice that the aggregate shipments of maize, barley, and oats in those seasons averaged only 24,000,000 qrs., showing that the demand in eight years has more than doubled. Turning

now from the general to the particular, we set down some of the items of information we have gathered in the course of our enquiry into the question of the precise utilisation of the maize supply of each of the principal importing countries.

### PRINCIPAL COUNTRIES' IMPORTS.

Last season, 1st August, 1926, to 31st July, 1927, the following quantities were imported into Europe:—

	Qrs.
Great Britain and N. Ireland ... ..	8,550,000
Irish Free State ... ..	1,570,000
Belgium ... ..	3,210,000
Germany ... ..	7,420,000
Czecho-Slovakia ... ..	1,490,000
Denmark ... ..	3,150,000
France ... ..	3,510,000
Holland ... ..	5,560,000
Italy ... ..	1,820,000
Scandinavia ... ..	1,160,000
Spain ... ..	1,900,000
Austria ... ..	900,000
Portugal, etc. ... ..	700,000
Switzerland ... ..	570,000
Total Europe ... ..	41,510,000
Ex-Europe ... ..	2,300,000
Grand Total ... ..	43,810,000

During the first six months of the current season, *i.e.*, from 1st August, 1927, to 31st January, 1928, European countries alone imported 23,657,000 qrs., or at the rate of 47,300,000 qrs. per annum; in addition to which various smaller importers in Europe and in ex-Europe imported over 1,000,000 qrs. in that period, indicating a total of 50,000,000 qrs. as the world's consumption of imported maize.

The primary aim of our investigations has been to arrive at some idea as to the portion of this huge quantity of maize which was used for pig-feeding, and so hit on some indication as to the effect which a large liquidation in swine would have upon the future demand.

### CONCLUSIONS.

Maize has owed its popularity in the past two years to the fact that, pound for pound, it was cheaper than any other commercial feeder. Its cheapness not only enabled it successfully to compete with other grain, but it also enabled farmers and breeders greatly to increase their supply of live stock at a good profit to themselves. The number of pigs, poultry, cattle, etc., increased in most countries of Europe. In some instances the increase was truly remarkable. The question now arises as to whether this increase can be maintained with maize at 35s. to 40s., instead of 29s. to 30s. per quarter (480 lb.).

One might be tempted to answer this question by saying that as the low price of maize has been the cause of the increase in live stock, the present high price of this cereal will be equally the cause of a corresponding decrease. The problem, however, is not so easily settled. Breeders are always reluctant to indulge in anything suggesting a wholesale liquidation of stock for the reason that their markets must inevitably suffer thereby.

There is, moreover, the eternal hope that prices will move in their favour. Maize and other feeders may be dear now, but will they be dear in a few months' time? It may well be deemed advisable to carry on even at a loss to see what luck the future will bring. When the loss is serious, liquidation naturally becomes inevitable, but when it is a question of reduced profit or only a small loss, there is a distinct incentive to carry on in the hope of a repetition of the conditions which made an increase in stock originally profitable.

A very fair proportion of the increase in live stock which has taken place during the past two years has been in poultry, and so far as our information goes, there has been no tendency towards liquidation since the rise in the price of maize. The poultry demand for maize is much more of a retail nature than in the case of pigs or cattle, and when it is a question of ounces instead of cwts., a rise of 10s. a quarter is not so obvious to the purchaser.

The only description of live stock of which there has been any suggestion of general liquidation is swine. We understand that in most of the Western European countries com-



paratively large numbers of swine have been killed off in recent months. It has been demonstrated that the relation between maize prices and the number of swine varies considerably in different countries. In Germany, Holland, Norway, Denmark, Sweden, and Switzerland, the estimated quantity of maize fed to pigs is 40 per cent. to 85 per cent. of the total supply, but in Great Britain, France, Belgium, etc., the percentage is only 10 per cent. to 25 per cent. It is obvious, therefore, that in the former group of countries the number of swine will have a vital influence on the maize demand, while in the latter group the effect will be correspondingly small. Making a hypothetical calculation on a presumed 25 per cent. reduction in the number of swine in the main pig-breeding countries, we estimate the resultant falling off in the maize demand as follows:—

	Qrs.
Germany ... ..	800,000
Holland ... ..	600,000
Denmark ... ..	800,000
Sweden ... ..	200,000
Norway ... ..	150,000
Switzerland ... ..	100,000

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Total, six countries ... .. 2,650,000

Perhaps for the whole of Europe the total reduction may be estimated at about four to six million quarters.

The price of maize, just as much as the price of other articles, is subject to the fundamental laws of supply and demand. Three wonderful Argentine harvests in successive years brought the supply to a figure greatly in excess of the demand—hence the low prices of 1926 and 1927. Now the demand has overtaken the supply, and prices have risen again. We think the trend of the facts and figures given in this article indicates that, although the high price of maize and liquidation in swine may now cause a reduction in the demand, there is little reason to anticipate a serious immediate falling off. The number of live stock in Europe is still very much larger than it was two or three years ago, and offers a wide market for all descriptions of foreign feeding grain. What better feeder is there than Argentine maize?

## Movements of New Settlers.

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The following new settlers arrived in this Colony during the month of September, 1928:—

J. E. Furness.—Arrived from Great Britain on 10th August and proceeded to Mr. Furness, Seaton, Marandellas, for a period of training.

A. S. Cunningham.—Arrived from Kenya on tour of inspection.

V. E. Coventry.—Arrived from the Union on 29th August and has acquired land near Hartley.

G. M. Wallace.—Arrived from Great Britain on 6th September and proceeded to Colonel Bartley, Eastclare Estate, Que Que, for a period of training.

A. S. Gibson.—Arrived from Great Britain on 7th September and proceeded to Mr. R. N. Tanner, Buwi, Sinoia, for a period of training.

A. C. Filloneau.—Arrived from Great Britain on 7th September and proceeded to Colonel Haslam, Forres, Bromley, for a period of training.

Lt.-Colonel Watson.—Arrived from Great Britain on 7th September and has acquired Chikoma Chimunga, Banket.

A. B. Parker.—Arrived from Great Britain on 7th September and is with Colonel Watson on Chikoma Chimunga, Banket.

A. Stephenson.—Arrived from South-West Africa on 7th September on tour of inspection.

The Hon. H. V. Gibbs.—Arrived from the Union on 8th September and is now undergoing training with Major Sharpe, Redbank, Bulawayo.

A. G. Theunissen.—Arrived from the Union on 12th September on tour of inspection.

M. P. Geldenhuys.—Arrived from the Union on 13th September and has acquired Makoni Kop, Rusape.

H. I. Odendaal.—Arrived from the Union on 13th September on tour of inspection.

E. J. Trow.—Arrived from the Union on 21st September on tour of inspection.

Mr. and Mrs. P. S. Timms.—Arrived from Great Britain on 28th September and proceeded to Mr. Timms, Quagga Kloof, Inyazura.

A. I. J. Nil.—Arrived from the Union on 28th September on tour of inspection.

B. P. Botha.—Arrived from the Union on 28th September on tour of inspection.

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## Seed for Sale, 1928.

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	s.	d.
Kinvarra Oats ... .. per 100 lbs.	25	0
Boer Manna ... .. per lb.	0	4
Red Manna ... .. per lb.	0	4
Sweet Potato Slips ... .. per bag	5	0
Napier Fodder Roots ... .. per bag	5	0

Prices are f.o.r. Gwebi. Before sending cheques, intending purchasers are advised to ascertain that the seeds required are still available. Cheques should be made payable to "Gwebi Farm." Orders and enquiries should be addressed to the Chief Agriculturist, Salisbury.

*Note.*—When remitting money in payment of seeds, etc., to assure prompt dispatch, it is necessary that railage should be included when goods are to be railed to a siding.



# Southern Rhodesia Veterinary Report.

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July, 1928.

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## AFRICAN COAST FEVER.

Seven head were destroyed at the infected farm Morgenson, in the Melsetter district. No cases at any other infected area. In Matabeleland the quarantine areas were reduced very considerably.

## QUARTER EVIL.

Prevalent in various districts.

## TRYPANOSOMIASIS.

A number of cases in cattle reported from the Hartley and Melsetter districts.

## HORSE-SICKNESS.

Two deaths occurred in the Mazoe district and one in the Bubi district.

## DIPPING OF CATTLE.

Owing to scarcity of grazing and water, it has been necessary to exempt cattle from dipping, or to extend the dipping interval, in many areas.

## TUBERCULIN TEST.

During the month 130 cows and 37 bulls were tested at Bulawayo on importation. Five cows gave uncertain reactions and were detained for a further test. One cow re-acted and the existence of tuberculosis was confirmed on *post-mortem* examination.

At Gwelo 14 head *ex* Union were tested; four were detained for a further test.

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IMPORTATIONS.

From the Union of South Africa:—Bulls, 19; cows and calves, 219; horses, 33; donkeys, 169; sheep, 1,416; goats, 771; pigs, 63.

## EXPORTATIONS (CATTLE).

To the Union of South Africa: For local consumption, 1,370; for export overseas, 2,066; for Birkenhead, 140. To Belgian Congo: For slaughter, 1,458; for breeding, 1,682. To Northern Rhodesia: For breeding, 10. To Portuguese East Africa: For slaughter, 104; for transport, 33.

## EXPORTATIONS (MISCELLANEOUS).

To Union of South Africa: Pigs, 35. To Belgian Congo: Goats, 65; sheep, 65; pigs, 111. To Northern Rhodesia: Horses, 4; goats, 13; sheep, 248. To Portuguese East Africa: Goats, 27; sheep, 33.

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August, 1928.

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AFRICAN COAST FEVER.

Four head were destroyed on the infected area at Morgenson, Melsetter district. No cases at any other centre.

## QUARTER EVIL.

Prevalent in most districts, particularly amongst native cattle in Matabeleland.

## TRYPANOSOMIASIS.

Five cases reported in Melsetter, one in Hartley and five in Umtali districts.

## ANTHRAX.

An outbreak occurred in the Gwanda district, and all in contact were inoculated. Cases occurred at the infected area in the Bulalima-Mangwe district. Twelve pigs contracted the disease on an infected farm, Salisbury district.

## IMPORTATIONS.

From the Union of South Africa: Bulls, 23; cows and calves, 110; heifers, 12; horses, 11; mules, 2; donkeys, 27; sheep, 1,297; goats, 601; pigs, 19.

## EXPORTATIONS (CATTLE).

To Union of South Africa: For local consumption, 1,400; for export overseas, 4,949. To Belgian Congo: For slaughter, 1,372; for breeding, 2,352. To Portuguese East Africa: For transport, 32.

## EXPORTATIONS (MISCELLANEOUS).

To Union of South Africa: Horse, 1; sheep, 22; goats, 230; pigs, 64. To Belgian Congo: Horses, 15; sheep, 75; goats, 65; pigs, 75. To Northern Rhodesia: Horse, 1; mules, 2; goats, 61; sheep, 177.

J. M. SINCLAIR,

Chief Veterinary Surgeon.

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Notice.

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The Veterinary Department, Salisbury, now supplies blue tongue vaccine for the inoculation of sheep at one penny per dose, wire worm remedy at 1s. 3d. per tin of 100 doses, and dosing outfits complete, 12s. 6d.

Cash should accompany orders.



# Southern Rhodesia Weather Bureau

AUGUST AND SEPTEMBER, 1928.

**Pressure.**—During August the mean pressure was generally high, varying from 0.005 in. above normal at Umtali to 0.031 in. above normal at Fort Victoria.

During September the pressure was uniformly low, varying from 0.041 below normal at Fort Victoria to 0.024 below normal at Umtali.

**Temperature.**—*August.*—During the month the mean temperatures were low, varying from 3.0 deg. F. below normal at Tuli to normal at Sinoia.

The mean maximum temperatures were low, varying from 4.5 deg. F. below normal at Vermont, Melsetter, to 0.3 deg. F. below normal at Shamva.

The mean minimum temperatures were low, varying from 3.8 deg. F. below normal at Tuli to 1.4 deg. F. above normal at Gatooma.

The relative humidity was generally below normal, except in the Melsetter district.

*September.*—During the month the mean temperature was very high, varying from 3.8 deg. F. above normal at Gwelo to normal at Riverdene North.

The mean maximum temperatures were high, varying from 3.3 deg. F. above normal at Gwelo to 2.6 deg. F. below normal at Riverdene North.

The mean minimum temperatures were high, varying from 5.9 deg. F. above normal at Sinoia to normal at Mount Selinda.

The relative humidity was generally low, except in the Melsetter district.

**Zone C.—***Salisbury.—*

The mean pressure for the month was below normal, there being three highs and four lows. A sharp shower of rain fell on the night of the 19th, 0.16 in. being registered. High temperatures were recorded throughout the month until the 25th, when a maximum of 94.1 deg. was recorded. On the following day there was a considerable fall and cold weather was experienced for three days. There was much wind throughout the month, often accompanied by dust. On the 26th and 27th the sky was overcast and a few drops of rain fell, but the weather cleared up on the 28th.

**Zone E.—***Fort Victoria.—*

The month was fine, with slight frosts on 12th and 13th September. There was a sudden drop in the temperature on the 26th, when the maximum thermometer fell from 81 deg. to 55 deg. The hottest day was on the 24th, when 97.5 was registered in the shade. A very sudden and severe thunderstorm broke out on the night of the 17th and 0.83 in. of rain was recorded. Lightning was very vivid and the drift across the Umshindyke River on the Mashaba Road was under 5 feet of water. Winds have been variable.

*Riverdene North.—*

The temperature this month has been somewhat above the average, the highest reading (98 deg.) being on the 24th, and the lowest on the 26th, with 55 deg., there being on that date only five degrees between night and day. The winds have been more prevalent than usual from the westerly quarter, although fresh south-easters have been in evidence on several days. Much haze, owing to the heat, has been registered. A light drizzle occurred on the 2nd, and on the 17th after sultry weather a very heavy thunderstorm visited us, with most vivid lightning, which continued throughout the night, accompanied by a welcome rain of 0.75 in. This has brought on the grass wonderfully and freshened up all verdure. Cattle have benefited considerably. The river Popotekwe rose a foot for a day, but now is very low again and barely running.

## RAINFALL.

## AUGUST.

## ZONE A.

## INSIZA—

Orangedale ... ..	.36
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## UMZINGWANE—

Springs ... ..	.25
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## ZONE B.

## BELINGWE—

Bickwell ... ..	.02
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## BULALIMA-MANGWE—

Bruwapeg ... ..	.13
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Fallowfield ... ..	.25
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Garth ... ..	.07
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Maholi ... ..	.04
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Semokwe Reserve ... ..	.17
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## GWANDA—

Limpopo ... ..	.20
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## INSIZA—

Filabusi ... ..	.26
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Inyezi ... ..	.12
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Scaleby ... ..	.11
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## MATOBO—

Holly's Hope ... ..	.14
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Matopo Mission ... ..	.12
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Mtshabezi Mission ... ..	.08
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## UMZINGWANE—

Balla Balla ... ..	.30
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Essexvale ... ..	.13
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Hope Fountain ... ..	.12
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## ZONE C.

## CHARTER—

Enkeldoorn ... ..	.03
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The Range ... ..	.10
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## ZONE D.

## INYANGA—

Inyanga ... ..	.03
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Juliasdale ... ..	.38
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## ZONE E.

## BELINGWE—

Belingwe N.C. ... ..	.09
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## CHIBI—

Lundi ... ..	.93
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## CHILIMANZI—

Allanberry ... ..	.12
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Driefontein ... ..	.01
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Mukowries ... ..	.08
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## GUTU—

Eastdale Estates ... ..	.06
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Glenary ... ..	.10
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## GWELO—

Glencraig ... ..	.20
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## MAKONI—

Craigendoran ... ..	.18
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Forest Hill ... ..	.02
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Gorubi Springs ... ..	.55
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Tablelands ... ..	.26
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Whitgift ... ..	.11
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## MARANDELLAS—

Wedza Reserve ... ..	.03
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## MELSETTER—

Sabi Tanganda Estate ... ..	.24
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## NDANGA—

Doornfontein ... ..	.17
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Zaka ... ..	.41
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## SELUKWE—

Aberfoyle Ranch ... ..	.06
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Impali Source ... ..	.10
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Rio ... ..	.08
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Safago ... ..	.23
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## UMTALI—

Argyle ... ..	.09
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Embeza ... ..	1.84
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Fern Valley ... ..	.31
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Jerain ... ..	.06
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Park Farm ... ..	1.10
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Premier Estate ... ..	.12
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Sarum ... ..	.44
Sheba ... ..	3.66
Stapleford ... ..	1.72
St. Augustine's Mission ... ..	1.54
Umtali Gaol ... ..	.15

## VICTORIA—

Brucehame ... ..	.06
Cambria ... ..	.02
Gokomere ... ..	.31
Kimberley Ranch ... ..	.04
Zimbabwe ... ..	.42

## ZONE F.

## MELSETTER—

Chikore ... ..	.50
Lettie Swan ... ..	1.92

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 SEPTEMBER.

## ZONE A.

## BULALIMA-MANGWE—

Centenary ... ..	.54
Kalaka ... ..	1.90
Riverbank ... ..	1.01
Solusi Mission ... ..	.46

## BULAWAYO—

Keendale ... ..	.20
Lower Rangemore ... ..	.48
St. Peter's Diocesan School ... ..	.47

## INSIZA—

Orangedale ... ..	.47
Shangani ... ..	.05

## NYAMANDHLOVU—

Gwaai Reserve ... ..	1.97
Gwaai Siding ... ..	.02
Naseby ... ..	.50
Nyamandhlovu Railway ... ..	.65

## UMZINGWANE—

Springs ... ..	.15
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## WANKIE—

Matetsi Railway ... ..	.05
Ngamo Railway ... ..	.09
Sukumi ... ..	.57

## ZONE B.

## BULALIMA-MANGWE—

Edwinton ... ..	1.14
Empandeni ... ..	.15
Fallowfield ... ..	.22
Garth ... ..	.49
Maholi ... ..	.18
Retreat ... ..	.56
Sandown ... ..	.75
Semokwe Reserve ... ..	.03
Tjankwa ... ..	.49
Tjompani ... ..	.53

## MATOBO—

Fort Usher ... ..	.07
Holly's Hope ... ..	.05
Longsdale ... ..	.37
Matopo School ... ..	.25
Mtshabezi Mission ... ..	.01
Rhodes Matopo Park ... ..	.22

## UMZINGWANE—

Balla Balla ... ..	.10
Essexvale ... ..	.20

## ZONE C.

## CHARTER—

The Range ... ..	.04
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## HARTLEY—

Carnock ... ..	.04
Elvington ... ..	.13
Gowerlands ... ..	3.85
Pulham ... ..	.03
Thorndyke ... ..	.03

## LOMAGUNDI—

Kapiri ... ..	.50
Montrose ... ..	.14
Romsey ... ..	.07
Umvukwe Ranch ... ..	.09



## MARANDELLAS—

Rocky Spruit ... ..	.10
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## SALISBURY—

Ballineety ... ..	.01
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Bromley ... ..	.03
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Cleveland Dam ... ..	.02
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Salisbury Agricultural Department	.16
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Tobacco Experiment Station ... ..	.28
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Western Commonage ... ..	.15
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## ZONE D.

## INYANGA—

Inyanga ... ..	.03
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Juliasdale ... ..	.49
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## MAKONI—

Eagle's Nest ... ..	.17
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## MAZOE—

Argyle Park ... ..	.02
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Glen Divis ... ..	.08
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Virginia ... ..	.07
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Zomoi ... ..	.01
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## SALISBURY—

Datata ... ..	.04
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## ZONE E.

## BIKITA—

Angus Ranch ... ..	.39
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Bikita ... ..	1.06
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## CHARTER—

Buhera ... ..	.09
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## CHILIMANZI—

Allanberry ... ..	.05
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Driefontein ... ..	.12
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Grootfontein ... ..	.03
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Mtao Forest ... ..	.06
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Mukowries ... ..	.09
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## INYANGA—

St. Trias' Hill ... ..	.33
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## MAKONI—

Craigendoran ... ..	.02
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Mona ... ..	.56
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Monte Cassino ... ..	.05
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Tablelands ... ..	.03
Springs ... ..	2.50
Whitgift ... ..	.02
MARANDELLAS—	
Elandslaagte ... ..	.02
Macheke ... ..	.04
Wedza Reserve ... ..	.01
MELSETTER—	
Brackenbury ... ..	.37
New Year's Gift ... ..	1.05
Sabi Tanganda Estate ... ..	.84
NDANGA—	
Doornfontein ... ..	1.09
Zaka ... ..	.62
SELUKWE—	
Aberfoyle Ranch ... ..	.39
Impali Source ... ..	.01
UMTALI—	
Argyle ... ..	.05
Embeza ... ..	1.96
Fern Valley ... ..	.12
Jerain ... ..	.05
Park Farm ... ..	.81
Premier Estate ... ..	.46
Sheba ... ..	1.53
Stapleford ... ..	1.36
Umtali Gaol ... ..	.39
VICTORIA—	
Cambria ... ..	.85
Cheveden ... ..	1.67
Clipsham ... ..	.85
Gokomere ... ..	.22
Kimberley Ranch ... ..	.76
Mashaba ... ..	.86
Riverdene North ... ..	.76
Silver Oaks ... ..	1.04
Stanmore ... ..	.52
Victoria ... ..	.83
ZONE F.	
MELSETTER—	
Lettie Swan ... ..	1.63
Mount Selinda ... ..	1.56

# Export of Cattle from Southern Rhodesia, 1928.

Month	Union		Eng-land.	Congo		N. Rho-nesia	Portuguese East Africa.		Total
	Slaughter		Slaugh-ter	Slaughter	Breeding	Slaughter	Trek	Breeding	
	Johannes-burg.	I. C. S. for overseas							
January	55	...	...	1,370	39	...	108	...	1,572
February	190	...	...	2,287	453	...	111	...	3,041
March	562	2,746	...	4,257	13	192	39	...	7,809
April	957	4,927	...	3,468	12	193	84	...	8,641
May	1,522	5,864	...	4,545	11	...	36	...	11,983
June	2,278	6,000	...	1,505	949	...	177	...	10,914
July	1,370	2,066	140	1,458	1,682	63	104	33	6,863
August	1,400	4,949	...	1,372	2,352	...	...	32	10,105
September	879	571	...	2,076	147	4	32	...	3,709
October									
November									
December									

J. M. SINCLAIR,  
Chief Veterinary Surgeon



# Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Nov.	Dec.
Ayrshire—Sipolilo	Various farms	G. H. Cauterley	1928	1928
Banket Junction	Banket Hotel	A. M. Hutchinson	10	8
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	2	7
Bindura	Bindura Farmers' Hall	W. E. Fricker	29	27
Bromley	Farmers' Hall, Bromley Siding	E. Somerville-Collie	9	14
Bubi	Queen's Mine	C. H. Olsen	7	5
Bulawayo Landowners' and Farmers' Association	Library Buildings, Bulawayo	W. A. Carnegie	13	11
Chakari	Balwearie (Nov.), Turkois Mine (Dec.)	L. T. Tracey	8	13
Daisyfield	Somabula (Nov.), Daisyfield (Dec.)	L. E. Edwards	21	19
Darwendale—Trelawney	Various farms	C. S. G. Budge	10	15
Eastern Districts	Farmers' Hall, Chidza	W. E. Richards	28	26
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	10	8
Enterprise	Farmers' Hall	James Watson	6	4
Essexvale	Essexvale	Col. D. Judson	6	4
Felixburg—Gutu	Ferndown (Nov.), Blyth (Dec.)	A. J. Bradshaw	18	16
Figtree Branch, R.L. and F.A.	Figtree Hotel	The Secretary	10	8
Gadzema	Gadzema	M. G. Leahy	6	4
Gatooma	Speck's Hotel	J. A. Smith	9	14
Gatooma (Golden Valley Branch)	Golden Valley Hotel	C. A. K. Beaton	17	15
Gazaland (South Melsetter)	Chippinga Hotel	Mrs. C. N. Reading	10	8
Greystone	Quarrie Farm	P. J. van der Walt	5	3
Gwanda	Lowenthal's Building, Gwanda	N. J. B. Nilson	10	...
Hartley	Old Schoolroom, Hartley	E. Etheredge	...	15
Headlands	Headlands	J. A. Eve	24	22
Hunter's Road	Hunter's Road	R. W. Twilley	...	29
Insiza South	Farm Lancaster	J. Campbell	24	13
Inyazura	Inyazura	W. P. Frudd	8	7
Lalapansi	Lalapansi	Edmund Chapman	...	8
Lomagundi	Sinoia	F. W. Robertson	10	...
Lomagundi West	Various farms	A. A. Bisset	...	9
Macheke	Farmers' Hall, Macheke	The Secretary	11	...

Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	T. R. Colam	3	1
Makwiro	Makwiro	F. H. Howard	16	21
Marandellas	Marandellas Farmers' Hall	E. Cruikshank	2	7
Marandellas, Southern	Various farms	D. L. Gale	7	5
Mashonaland	Mashonaland Farmers' Hall, Salisbury	C. Lamb	9	14
Matopo Branch, R. L. and F. A.	Farmers' Hall, Malindi	W. Mirtle	17	15
Mazoe (Concession)	Concession Hotel	Frank Allen	9	14
Mazoe (Glendale)	Farmers' Hall, Glendale		14	12
Melsetter	Court House, Melsetter	Dr. Rose	8	13
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	14	12
Ngezi-Umniati	Harvieston, Enkeldoorn	Miss Harvie	24	29
North Umniati		J. F. Eagar	Not	received
Norton and Lydiat District	Norton	R. D. Palmer	2	7
Nyamandhlovu	Nyamandhlovu	R. D. McLean	...	...
Odzi District Farmers	Odzi Hotel	F. H. Burnett	3	1
Poorte Valley	Various places	A. D. Wilson	17	15
Que Que	Offices of the Que Que Sanitary Board	J. Hogg	17	15
Rusape Farmers' Association	Rusape	R. Munch	3	1
Salisbury South	Various farms	P. Linton	28	26
Selukwe	The Hotel, Selukwe	W. T. Simpson	...	7
Shamva	Shamva Hotel	W. Stanley-Stollard	15	20
Two Rivers Farming Association	Various farms	W. L. Parsons	17	15
Umboe (Branch of Lomagundi F.A.)	Zebra Vlei (Nov.), Highbury (Dec.)	C. W. S. Ford	10	8
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	E. Wrightson	10	8
Umtali	Drill Hall, Umtali	A. Howat	1	6
Umvuma and District	Umvuma	H. B. Colling	Not	received
Victoria	Victoria	G. E. Lamb	3	1
Wankie District		W. Brownlee-Cumming	Not	received
Western	Plumtree Hotel	The Secretary	10	8
Willoughbys	Willoughbys	A. E. Roberts	Not	received

## Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
De Grendel Rita	Friesland	4,845.50	...	150	W. R. Blackwell, Norton
Home Park Mary III.	do	7,587.00	...	270	R. G. Fox, Umtali
Rathwick Princess IV.	do	4,602.00	...	210	do do
Home Park Elske V.	do	6,681.25	...	210	do do
Rathwick Maud III.	do	6,410.50	...	210	do do
Home Park Alma V.	do	6,883.50	...	210	do do
Rathwick Mermaid	do	7,144.00	...	210	do do
Umtali Nereid...	do	4,217.75	...	180	do do
Umtali Queen ...	do	4,073.25	...	150	do do
Home Park Agnes	do	5,276.00	...	150	do do
Umtali Mary ...	do	3,373.00	...	150	do do
Dapple ...	do	2,981.00	...	90	A. T. Holland, Chatsworth
Princess ...	do	3,464.00	...	120	do do
Rhoda ...	do	1,897.00	...	60	do do
Palm Tree Milly	do	9,798.00	...	487	M. Inge, Sinoia
Palm Tree Neeltje	do	7,798.00	...	357	do do
Palm Tree Ethel	do	5,773.00	...	255	do do
Langton Nessie	do	2,695.00	83.57	154	do do
Langton June...	do	2,489.00	78.71	129	do do
Langton Daisy	do	1,399.00	51.30	81	do do
Erin-go-bragh	do	1,632.50	...	60	W. S. Mitchell, Iron Mine Hill
Stapleford ...	Grade	157.00	...	5	J. S. Newbegin, Eldorado
Beans ...	Friesland	116.00	...	5	do do
Joyce ...	do	2,409.50	...	60	W. F. H. Scutt, Norton
Bertha ...	do	1,904.00	...	60	do do
Noreen ...	do	1,951.50	...	60	do do
Sybil ...	do	1,811.50	...	60	do do
Dorothy ...	do	1,493.00	...	60	do do
Beryl ...	do	1,632.00	...	60	do do
Frances ...	do	2,048.00	...	60	do do
Lady Jane ...	Friesland	3,978.00	139.01	210	R. R. Sharp, Redbank
Thibet Park Zoe	do	4,914.00	167.83	180	do do
Thibet Park Eoz	do	2,669.00	89.40	120	do do
Jane ...	Grade	7,561.50	...	360	C. E. Strickland, Shamva
Betty ...	Friesland	7,534.00	...	360	do do
Freecia ...	do	3,395.50	...	120	do do



## RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Mona ...	Grade Friesland	2,786.50	...	120	C. E. Strickland, Shamva
Poppy ...	do	2,159.00	...	90	do do
Kate ...	Grade Shorthorn	3,635.75	...	180	do do
Daisy ...	Grade Friesland	1,593.50	...	60	do do
Kitty ...	Friesland	2,181.75	...	90	do do
Geranium ...	Grade Shorthorn	693.50	...	30	do do
Groenvlei Bed- ford Alberta	Friesland	5,626.05	...	150	P. T. Webb, Iron Mine Hill
De Grendel de Hoop	do	9,201.00	279.93	236	Gwebi Farm
De Grendel Roza	do	5,654.75	144.52	228	do do
De Grendel Froukje	do	9,072.50	237.63	220	do do
De Grendel Selma	do	7,776.25	217.03	182	do do
De Grendel Laura	do	4,385.50	128.66	147	do do
Flora of Elsmore	do	6,186.25	208.11	247	do do
Wit Fancy ...	do	6,580.75	196.36	268	do do
Mimosa Pel Stiensers	do	6,033.00	206.50	244	do do
Mimosa Clara II.	do	6,454.25	198.37	189	do do
Mimosa Clara X.	do	6,024.00	173.02	91	do do
Melrose Corrie...	do	5,585.25	243.85	129	do do
Melrose Roosje	do	2,740.00	67.40	65	do do
Melrose Maandag	do	1,427.00	36.12	34	do do
Fanny ...	Grade Friesland	10,075.50	315.96	304	do do
Lucy ...	do	6,304.25	179.09	244	do do
Katie ...	do	6,385.00	201.84	224	do do
Kleinbloem ...	do	6,355.25	189.42	211	do do
Gwebi Waterbloem	do	3,830.50	109.65	205	do do
Gwebi Janie ...	do	2,320.00	78.24	126	do do
Gwebi Laura ...	do	1,361.00	32.11	35	do do
Gwebi Elsie ...	do	2,361.25	70.53	46	do do
Hannah ...	do	9,433.50	292.03	212	do do
Gladys ...	do	4,048.25	119.39	84	do do
Rooddebloem ...	do	443.50	8.87	21	do do
Waterbloem ...	do	473.50	10.98	11	do do
Allie ...	Friesland	648.00	19.44	14	do do

# Farming Calendar.

## November.

### BEE-KEEPING.

Now that the first honey flow is on, be sure the hives stand level, whether working them for extracted or section honey. This is important, saving annoyance when preparing the product for market. Occasionally, where bees have not been thoroughly subdued, they object to the removal of honey; postpone the operation for 24 hours. Where increase of stocks is required, artificial swarms can now be made. Use care in storing honey.

### CITRUS FRUITS.

If no appreciable rain has fallen, irrigation must be resorted to in order to keep the trees in good growth and to prevent any check to fruit development.

This is a good month to plant green crops. Sunn hemp is possibly the best crop to smother weed growth and supply humus-forming material after it is ploughed in.

If not already done, storm drains should be made on the sloping ground to prevent erosion of the surface soil during heavy storms.

Where new plantings are contemplated, the holes should be dug and everything got in readiness for planting if the trees are ready for lifting in the nurseries.

All unthrifty trees could with advantage have an additional amount of fertiliser and manure applied during the month. Keep down all water shoots.

### CROPS.

Take note when the first rains fall, and see what leaks there are, if any, in the farm buildings. Do not neglect to effect such repairs as are necessary.

Early in the month see that the planters are in perfect order, and that they drop the different seeds to be planted evenly and at the right distance. Try them out on the farm road.

Hasten the work of getting the lands for early sown crops into as good a condition for seeding as possible, so that the first and most favourable opportunity for planting may be seized. The young plants make more rapid growth in a good seed-bed. Utilise exceptionally early rains for this purpose rather than for planting.

The holes for check-row planting of maize can continue to be prepared until sufficient rain has fallen to allow of planting.

Velvet beans and dolichos beans for seed or hay may be planted dry if the land is in good order.

With favourable weather, planting of maize, velvet and dolichos beans and cotton will commence about the middle of the month, and will continue as the condition of the land and the rainfall permit.

Main crop potatoes should be planted from now on to January.

Dhal may be planted for seed or green-manuring—if for seed, a frost free situation is necessary.

Kaffir corn for seed may be planted this month.

Green-manure crops requiring a long growing season should be planted.

Destroy, by feeding or burning, early planted trap crop of maize or volunteer plants which have become infested with stalk-borer.

If weeds are beginning to show, keep the harrows going in front of the planters. If weeds are too advanced to be killed by drag harrows and too numerous to be dealt with by hand labour, use the disc harrow or lightly re-plough the land.

If the tilth is good, do not be afraid to harrow the young maize. This will save much labour later on by destroying the weeds while they are small.

#### DAIRYING.

In a normal year veld grazing should be plentiful in November, and the feeding of dairy stock is then very much simplified; veld grass in a green and succulent condition is practically all that is required for animals of less than average production. Heavy milking cows, however, on early pasture, require extra feed in the form of concentrates, while the latter should always be fed to dairy stock which are in poor condition at this time of the year. Young calves should not be turned out to graze with the herd, and in wet weather are best kept in a clean, dry, airy pen. Weaned stock, which have not hitherto had access to green pasture, should be gradually accustomed to the change in diet and may at first be turned out to graze for short periods. Young stock on pasture should also receive a small daily allowance of concentrates.

Farmers supplying cream to the creamery should adjust the cream screw to the separator so that the latter will separate a cream testing 45 to 50 per cent. butter fat. Cream of this consistency will keep better than thinner cream. It should be borne in mind that it is practically impossible to produce first-grade cream if the cattle are milked in a muddy kraal. In the absence of a cow shed, every endeavour should be made to erect a small milking shed in which four or five cows can be tied, milked and fed. A small shed of this kind is also essential to obtain clean milk for cheese-making. Milking in a muddy kraal invariably results in a gassy, bitter cheese being produced.

The shelves of the cheese room should be scrubbed with boiling water and soda, and for the last rinsing a weak solution of formalin may be used. This should prove effective in controlling cheese pests.

#### DECIDUOUS FRUITS.

Continue thinning out fruit on the trees if a very heavy setting has occurred. A small amount of large-sized fruit is preferable to a large crop of small fruit. Thin down the inner growth of new shoots if they have a tendency to crowd each other, and stop all suckers and main stem growths as they appear.

#### ENTOMOLOGICAL.

**Maize.**—Crops planted before the last week in this month are liable to suffer later from stalk borer. At Salisbury, crops planted after 27th November have escaped serious injury, but early December plantings are probably the safest. Volunteer maize is commonly badly infested and should be cut out and removed immediately, otherwise the borers tend to spread to surrounding plants. If rain has fallen sufficiently early, lands may be baited at the end of the month against surface beetles, snout beetles and other pests which tend to reduce the primary stand of plants. The formula is arsenite of soda 1 lb., cheapest sugar 8 lbs., or molasses 1 gallon, water 10 gallons. Dip chopped Napier fodder or



other green stuff and distribute broadcast. The poison may be sprayed over volunteer maize and weeds on land with good effect. Cutworms do not usually appear in numbers until December, except in low-lying land. Succulent green stuff soaked in a 2 per cent. solution of sodium fluoride is the most recent formula for poisoned bait, but destruction of these pests is difficult. Keep the land clear of weeds as a preventive measure. If the young plants are attacked by the black maize beetle (*heteronychus*), the only remedy is to destroy by hand. Good, clean farming will control these pests to a large extent.

**Tobacco.**—This crop is subject to many pests in its early stages, although attacked by a few after vigorous growth has started. Keep cheese cloth covers on seed beds at night to exclude pests, and spray regularly with arsenate of lead (powder) 1 lb. in 30 gallons of water to protect against leaf-eating insects, etc. Lands may be baited against surface beetles with maize bran moistened with arsenate of soda 1 lb. in 30 gallons of water. Distribute in balls about the size of a golf ball and cover over with branches or anything to protect from sun. Place one ball to each ten plants and moisten again when dry.

**Potato.**—The first brood of leaf-eating ladybirds appear in November. Spray with arsenate of lead (powder) 1 lb. in 30 gallons of water. Spraying is also useful against the black blister beetles, which sometimes attack the crop on sandy soils. Keep the soil of irrigated crops well hilled and in friable condition as a precaution against tuber moth laying eggs on the tubers.

**Kitchen Garden.**—Plants of the cabbage family are liable to attack by diamond-back moth and other leaf-eating insects. When considered desirable, young plants may be dusted lightly with arsenate of lead (powder). Cabbage aphid may be kept in check by liberal watering and frequent washing with a forceful stream of water from a hose pipe or spray pump. Drenching the plants regularly with cold water is also held to be a good remedy for the diamond-back moth mentioned above.

**Deciduous Fruits.**—Young trees may need spraying with arsenate of lead (powder) 1 lb. in 20 gallons of water as a protection against chafer beetles, whose attack may check the growth very seriously. Choice varieties of early peaches may be netted to protect them from fruit-piercing moths.

When in doubt as to the identity of any pest or the method of dealing with it, apply promptly to the Chief Entomologist, Salisbury, bringing or sending specimens of the insects concerned. Note, however, that it is sometimes feasible to prevent injury from pests for which no practical remedy is known. Farmers should therefore endeavour to obtain some knowledge of the pests of the crops they are growing through the articles published in this Journal.

#### FLOWER GARDEN.

All seeds may now be planted. Annuals for January flowering should be sown, amongst which the following will be found to do excellently in this country:—Balsam, Calliopsis, Centurias, Chrysanthemum, Dianthus, Escholtzia, Marigold, Mignonette, Gallardia, Phlox, Poppy, Nasturtium, Nigella, Verbena and Zinnia. These are all hardy, and may be sown in the open either in beds or in the position desired for flowering. Advantage should be taken of each shower of rain during this month to keep the soil well worked and loose.

#### VEGETABLE GARDEN.

All vegetable seeds may be sown during this month. Tomatoes and early peas and beans should be staked. The soil should be kept loose and free from weeds, which now get troublesome. Sow pumpkin, mealies, peas and potatoes.

#### FORESTRY.

Prick out into tins or trays any seedlings that are ready. Seedlings in open beds may have their tap roots cut so as to develop fibrous lateral

roots. Sowings of eucalyptus seed for late planting should be made. Cross plough and harrow land to be planted. If fresh seed is obtainable, sow seed of cedrela toona.

#### POULTRY.

Some birds will now be commencing to moult. This will cause a decrease in the number of eggs laid. The poultry keeper, therefore, should see that his birds come through the moult as quickly as possible. Some birds will lay and moult simultaneously, but these are the strongest, most vigorous and the best layers; the majority do not. The process of moulting is a natural one, but it is a severe strain on the system. Fowls that are not too fat, and can stand extra feed at the commencement of the moult, come through it best. More green and animal food should be given, and the utmost care taken that they are not exposed to cold or wet, otherwise they will not only take longer to moult, but go off in condition. A little linseed stewed, or linseed meal, or ground nut meal and milk should also be given. There will next month be a demand for table birds, and such as the poultry keeper intends to sell should be selected. In making this selection, it is no use choosing old or scraggy birds, for it is hopeless to attempt to fatten these, or make them good table birds. Do not coop them up till a fortnight or so before they are to be sold; give them free range and feed them well, with at least one feed of soft food mixed with milk once a day. Turkeys destined for the Christmas market should have free range, but also a feed of soft food once a day, and a good feed of mealies in the evening.

#### STOCK.

Cattle.—Normally rains should have fallen and the veld should be plentiful now. Beyond careful dipping, ranchers should not have much worry. If the season is bad, the poorer cattle should be drafted out and given a little hay, ensilage or mealies daily. Dairymen will not require to feed much succulent food, and usually the more expensive protein foods may be considerably curtailed at this time, but good sweet hay and mealies will be found to be very beneficial to milch cows, even if the veld is very plentiful. Clean dry sleeping places for both cows and calves will pay handsomely for any extra trouble involved. Young calves do not need to walk far, and in wet weather are much best in a clean dry pen. Watch for ticks.

Sheep.—Keep the sheep on high dry land. Be careful to keep the ticks down. Be sure the kraal or sheep shed is dry and clean, and that there is shelter from the rain for young lambs.

#### TOBACCO.

Continue to sow seed beds, watering, etc. When early beds become overgrown and hard, pull out, dig up and re-sow. Begin transplanting with the first good rains, and continue as fast as the rains and planters will allow, until the crop is set out.

Be careful to fill in the misses from previous transplanting before starting on new fields; use the stoutest and best plants for filling in, and try to get the tobacco from any one field to grow and come to maturity as near at the same time as possible. Discontinue filling in when the field has been planted for several weeks, and has made a good start to grow, as the later filled in plants will be choked out by the earlier ones, and will not come to maturity. Cultivate fields as soon as plants are established, to keep down weeds.

#### VETERINARY.

Early heavy rains might bring on horse-sickness before its usual time, but as a rule it need not be feared till the first rains are over in December.

#### WEATHER.

The rains should be commencing, if not already begun; occasionally they have delayed until December, and even later, before setting in properly. Between spells of wet weather lasting several days, fine dry periods occur, at first clear, but later cloudy and thundery, gradually



gathering to burst in thunderstorms. The mornings are generally fine, and rain falls chiefly in the afternoon or evening. Heavy downpours are to be expected, and should be provided against beforehand by means of ditches and embankments, and by clearing water ways and furrows.

In a normal season the rainfall varies from two-and-a-half to three inches in Matabeleland, and from three-and-a-half to four inches in Mashonaland generally, with the exception of the eastern border, where it amounts to five inches.

Between the rain periods and prior to the commencement of the rains, severe heat is likely to be experienced.

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## December.

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### BEE-KEEPING.

With a normal season the first or main honey-flow of the year should now be over and the honey ready to be robbed. Before doing this, see that all or the main portion of the frames are capped and sealed, otherwise there will be trouble later on by fermentation. There is nothing on the market to equal the Porter bee-escape board to clear out the bees from the crate, but be sure and see that the board in question is placed the right side up under the crate; failure to do this (and in the hurry of the minute it can easily be so done) will result in the probable suffocation of the bees and the loss of the honey, to say nothing of the chances of robbing from any close-by hives. Replace the empty combs and frames as soon as possible on the hives, to be cleaned up and mended where necessary, and for future storage of more honey. During the very hot spells watch the hives and provide extra ventilation, by inserting small metal wedges between the crates, just wide enough to allow air in, but not a bee under any consideration. Keep all water tins under the hive-stand legs full of water, and see that water is available for the worker bee, which drinks a good deal. When extracting honey, do so in a bee-tight room or verandah, otherwise the operator may have a lot of trouble from other colonies, which quickly find where honey is. Always have one or more crates of shallow frames ready with foundation fixed to place on hives as the season may warrant; such will mean always something for the bees to work at, and during the last flow they may be invaluable to store any such catch crop of nectar, as from tobacco, etc., when the natural flora is finished.

### CITRUS FRUITS.

This is a good month to plant citrus trees into their permanent positions. They should on no account be planted deeper than they stood in the nursery. Water each tree immediately after planting it to settle the soil, then loosen the surface when sufficiently dry to check weed growth and restrict evaporation; continue loosening the surface soil after each rain or watering.

If good rains have fallen, disc the grove in two directions, then sow the cover crop and harrow also in two directions. If the grove is weedy it should receive a shallow ploughing in place of the discing. Then sow the seed and harrow the soil.

All bearing trees must be kept well watered if the weather continues to remain dry. Trees that suffer for want of moisture while the young fruit crop is developing will be adversely affected, and the crop—if any—will be of inferior quality.

Continue to rub off all water shoots or suckers which develop on the tree stems.



## CROPS.

Keep the cultivators going, both on planted and unplanted lands, whenever weather conditions are favourable. Destroy the weeds while young and before they obtain a firm root-hold.

Continue planting maize, cotton, beans and ground-nuts as early as possible this month; followed by sunflowers, Sudan grass, manna, pumpkins and cattle melons.

Linseed, cowpeas, teff grass, oats, sunn hemp, should be planted after the other crops are in.

Ensilage crops may be sown at the end of the month.

When harrowing maize after planting, this work should be done in the heat of the day when the young plants are flaccid and not easily broken.

On lands not yet planted the crop of weeds should be kept down by disc-harrowing.

It is a good plan to harrow or disc-harrow immediately before the planter, or alternatively to follow the planter with a light harrow.

Treat seed oats for smut before sowing. Use one pint of formalin to 25 gallons of water and steep the bag of seed for ten minutes.

Earth up early planted potatoes.

Keep a look out for the stalk-borer and top or otherwise treat affected plants.

New lands and old pastures may be broken, as circumstances permit, during December, January and early February, and again ploughed in from May to July. If they carry a heavy crop of grass it should be cut or burnt to enable good clean ploughing to be done.

Sweet potato slips should be planted early in this month. Do not fail to have in a few acres of this valuable crop.

## DAIRYING.

During the months of December and January veld grazing is usually plentiful, and very little extra feed in the form of concentrates is required for dairy stock. It should be borne in mind, however, that heavy milking cows are unable to satisfy their requirements for milk production from veld grazing alone, and should receive a daily allowance of grain; the latter should be fed at the rate of 2 lbs. for every gallon of milk produced daily, i.e., a cow producing three gallons of milk should receive 6 to 7 lbs. of concentrates. An excellent mixture for this purpose is one consisting of four parts maize meal and one part ground-nut cake.

During wet weather, the provision of a clean dry shelter for calves is essential; the latter should not be crowded together in a small, damp, badly ventilated pen or muddy kraal. When treated in this manner, a calf is very liable to contract various ailments such as scour, etc. Scour is entirely preventable, and is usually caused by over feeding, or feeding from dirty pails, feed boxes, etc. Calves which contract scour should be isolated, the milk ration reduced, and they should be dosed with a few tablespoonfuls of castor oil.

Under the weather conditions which now obtain, cream should be despatched to the creamery at least three times a week. It is of the greatest importance that cream should be cooled immediately after separation, and should be kept cool while on the farm and whilst in transit to the railway station or siding. While the cream is being cooled, it should be frequently stirred, using a stirrer with a plunger attachment. Warm, freshly separated cream should not be mixed with old cream which has already been cooled. Cool the fresh cream first and then mix thoroughly with the old cream. Gassiness is a common defect in the cream received at the creameries at this time of the year, and is caused by gas-producing

organisms with which the milk and cream are contaminated. These organisms abound in mud, manure, etc., and develop and multiply very rapidly at high temperatures. Any precautions therefore which may be taken to eliminate dirt, manure, etc., from the milk and to keep the cream cool will prevent the development of gassiness.

As the night temperatures are fairly high, cheese-makers should not attempt to use night's milk for cheese-making; morning's milk plus a starter will give the best results. Gouda cheese-making operations are not usually successful at this season of the year, owing to the poor quality of the milk and the prevalence of gassiness. This type of cheese is best manufactured during March and subsequent months.

#### DECIDUOUS FRUITS.

Cover crops may be planted when the rains commence, as recommended under citrus fruits.

Summer pruning may be commenced this month. If all undesirable shoots are taken out of the trees, the remaining shoots will receive sufficient air and light to mature.

Ripening fruit must be carefully harvested, graded and packed if satisfactory prices are to be secured. Do not gather any fruit when it is wet.

Keep all recently planted trees in good condition; the first year's growth is the most important. If the undesired shoots are rubbed off when they first appear, the retained shoots will receive all the nourishment and the tree will then grow to a large size.

#### ENTOMOLOGICAL.

Maize.—The first half of this month appears to be the best period during which to plant maize for the avoidance of stalk borer attack—at least in the Salisbury district. Hoe out and remove volunteer maize plants before the new crop is up, as they are liable to be infested with borer, which tends to spread to surrounding plants. Red soils may be baited with chopped Napier fodder or other suitable greenstuff dipped in arsenite of soda 1 lb., cheapest sugar 8 lbs. or molasses 1 gallon, water 10 gallons, to destroy surface beetles, snout beetles and other insects which may affect the primary stand.

Tobacco.—The enemies of this crop are in general most active during December, whilst the crop is still in the early stages of growth.

For information regarding tobacco pests, see "Rhodesia Agricultural Journal," January, 1928, or Bulletin No. 665.

In general, poisoned baits may be used against surface beetles, grasshoppers, crickets and cutworms. Against surface beetles, arsenite of soda 1 lb. in 30 gallons of water used to moisten maize bran is a good bait. Against grasshoppers and crickets the addition of 8 lbs. sugar or 1 gallon molasses to each 1 lb. of arsenite of soda is recommended. Spray with arsenate of lead (powder) 1 lb. in 30 gallons of water against leaf-eating insects and as a protection against leaf miners and stem borer. Transplants may be dipped head downwards as far as the roots in the poison. Discard seedlings infested with stem borer and root gallworm.

Cutworms.—Keep ground around seed beds as free as possible from vegetation, to prevent female moths from laying eggs there. From the time the plants show foliage of the size of a sixpence they should be sprayed weekly with arsenate of lead (powder) 1 lb. to 30 gallons of water. This should prevent cutworms developing in the beds, as the young cutworms attack the leaves of the seedlings, and so ingest the poison.

House Flies.—With the coming of hot weather and the rains, house flies greatly increase, and should be kept out of dwelling houses by mosquito netting, or poisoned in the following way:—Dissolve 1 lb. of sodium arsenite in 10 gallons of water, and add about 10 lbs. of cheap sugar (2



gallons of treacle) or other sweet substance. The mixture should be sprayed upon branches of shrubs or trees, which may be hung up in convenient places where flies congregate. These insects are attracted to the bait, and are easily poisoned.

Mosquitoes, Stable Flies.—Destroy breeding places around homestead. Poison or trap adults.

Potatoes.—Ladybirds and caterpillars may be injurious to the foliage, and on sandy soils blue blister beetles sometimes cause damage. Spray with arsenate of lead (powder) 1 lb. to 25 gallons of water.

Kitchen Garden.—Marrows, etc., are commonly attacked by leaf-eating beetles. Spray with arsenate of lead (powder) 1 lb. in 25 gallons water, plus 8 lbs. cheapest sugar or 1 gallon molasses. Dusting lightly with pure arsenate of lead powder should give protection. Young plants of the cabbage family may be dusted with pure arsenate of lead powder or with such powder mixed with up to six or eight parts of finely sifted, thoroughly slaked lime as a protection against leaf-eating insects.

Fruit Trees.—The regular collection and destruction of fruit beetles may be necessary. Choice varieties of peaches, etc., may be netted as a protection against pests.

#### FLOWER GARDEN.

This month is generally showery, and constant stirring of the soil is, therefore, necessary to keep it loose. Seeds of perennials and annuals for February blooms may be sown. Transplanting should be done in the evening or on a cloudy day. Carnations should be kept free from dead wood, and climbers attended to.

#### VEGETABLE GARDEN.

All vegetable seeds may be planted. All advanced plants should be constantly cultivated. Potatoes should be ridged, and peas, beans and tomatoes staked. This is a good month for planting the main crop of potatoes.

#### FORESTRY.

Preparation of land should be continued. If heavy rains have fallen during November and December, and inspection shows that the sub-soil is well saturated with water, tree planting operations may commence towards the end of the month. If insufficient rains have fallen, delay planting. Plant on dull rainy days or late in the afternoons. Take great care in setting out the plants. Avoid bending the roots, and do not plant deeper than the transplants were in the seed beds or trays.

#### POULTRY.

The poultry keeper should take precautions whereby the wet weather will not affect his birds' health and their laying powers. All houses must be absolutely watertight, the floor raised well above the level of the surrounding ground, thus preventing water seeping in and making it damp. The birds themselves should not get wet, and no pools of water should be seen in the runs. Foodstuffs also must be kept absolutely dry.

Many birds will at present be moulting; these require special treatment to bring them through it quickly, and if possible keep them in lay during the period. A pamphlet on this can be obtained from the Poultry Expert, Department of Agriculture. This lack of attention to the birds during the moult is one of the causes of the scarcity of eggs at this season. There is no need for it if poultry keepers would only look after their birds properly.

Those who intend disposing of their turkeys for killing at Christmas must avoid cooping them up, as is done when fattening fowls, for they immediately mope and go off their food. Give them free range, and in addition to their usual evening feed of maize, during the first week



of December give one of wheat or maize in the morning, and during the second and third weeks three meals a day, each one containing, in addition to wheat or maize, some crushed monkey nuts or sunflower seeds. Plenty of thick milk and chopped-up onions or onion tops should also be given.

Those who go in for ducks should feed well and get as many to marketable size as possible by Christmas, when they usually fetch good prices. They should be kept in a small run; nearly all their food should be wet mash, bran, pollard, maize meal, meat meal and milk, as much as they will eat three times a day, i.e., they should practically be allowed to spend their existence eating and sleeping. Big duck breeders often give a fourth meal by lamplight at 10 p.m., and the first meal is given at sunrise.

#### STOCK.

**Cattle.**—Ranching cattle should not require any attention beyond dipping, but any stock that are in weak condition will be the better for a little hay or a pound or two of maize at night until they have regained strength. The bulls should be returned to the herd either at the end of the month or in January, and it should be remembered that the better they are conditioned and fitted for their work the more hope there is of a good crop of calves. For this reason also every effort should be made to have all the female stock in strong condition. Dairymen will find that as the grass becomes lush and rank a supply of sweet veld hay, teff hay or, say, three pounds of crushed maize given in the sheds at night will enhance both the quality and quantity of the milk. This will be found to be the case more particularly in districts of heavy rainfall. Milch cows should be protected as much as possible from cold rains and hot sun. Yarding all night in a clean kraal provided with a simple lean-to shed well bedded up will be found to be very beneficial in seasons of protracted rainfall. The calf pen should be kept clean, dry and sweet, and young calves will be better kept in during very hot or very wet weather. Dipping should be regularly attended to.

**Sheep.**—Graze on the higher lands, keeping the kraals clean, dry and airy, and watch for ticks.

#### TOBACCO.

Continue preparation of land. The best results are obtained by transplanting on freshly prepared soil. Transplanting should be pushed on with as fast as transplants and climatic conditions will allow. As soon as plants begin to grow, go over the field and fill in all missing hills with strong selected plants, and then apply fertiliser to hasten growth and ensure early maturity. Cultivation should be commenced as soon as the plants start growing, especially on sandy soils. The crust caused by heavy rains should be pulverised through cultivation as soon as the surface soil is dry enough for tillage; this gives the young plants the benefit of the moisture stored in the soil. Do not neglect the late sown seed beds. Make every effort to finish transplanting before the end of the month, so that the crop will be harvested before dry, cool weather begins.

#### VETERINARY.

Occasional cases of horse-sickness may occur during this month. With the great increase in ticks, due to the heat and moisture, cases of redwater and gall-sickness may be expected, more especially amongst Colonial stock imported since the last rainy season. The cool weather which frequently follows the early rains is an excellent time for castrating calves and other animals.

#### WEATHER.

In Mashonaland the rainfall during this month varies from eight inches along the eastern border to six inches in the west. In Matabeleland it varies from five-and-a-half inches in the west to four-and-a-half inches in the south. Considerable divergencies from these normals may occur in

individual seasons, but on the whole this month is the most regular in its behaviour. Very heavy downpours may be looked for, and it is well to be provided by drains and ditches against the effects of very heavy rain storms. A dry spell about Christmas time is a very frequent, though not invariable, event in Rhodesia. This partial drought may last only a fortnight, or may extend to six weeks, in the latter event often causing some anxiety regarding young crops, especially those not yet through the ground. The best means of meeting this condition of the weather is by frequent surface cultivation by harrow or horse hoe to preserve a loose soil mulch on the surface and prevent losses of soil moisture by evaporation.

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## Government Farm, Matopos.

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### FOR SALE.

Pedigree Large White Pigs, Young Boars and Gilts,  
Prices on enquiry.—Apply to Manager, Government Farm,  
Matopos, Private Bag, Bulawayo.

## Notes from the "Gazette."

"Gazette"  
Date.

Items.

### ROADS.

- 5.10.28. That portion of the main Bulawayo-Shangani road between Shangani station and the level crossing on Blackwaters farm is closed. (G.N. No. 658.)
- 5.10.28. The deviation starting from Shangani station, thence running in a westerly direction, approximately parallel to the railway, and crossing Leechdale, Rosedale and Oaklands farms, a portion of Sub-division "C" of Blackwaters, Crown land and Blackwaters, to the level crossing on the latter farm, is declared as a main road in terms of section 2 of the "Road Regulations, 1896." (G.N. No. 658.)  
The road starting from Shangani station, proceeding in a north-westerly direction through Battle farm, thence west through the northern corner of Rosedale and into Oaklands farm, is declared as a branch road. (G.N. No. 658.)

### AFRICAN COAST FEVER.

- 5.10.28. Government Notice No. 417 of 1928, declaring an area of infection and guard area in the Umtali native district, is cancelled. (G.N. No. 659.)

### GAME LAW CONSOLIDATION ORDINANCE, 1906.

- 5.10.28. Government Notices No. 201 of 1913, No. 330 of 1914, No. 149 of 1927, No. 182 of 1927 in so far as they relate to the Hartley district, and No. 329 of 1928 are cancelled. The operations of sections 9, 10 and 12 of the above Ordinance are suspended until further notice within a defined area in the Hartley district. (G.N. No. 657.)

### AFRICAN COAST FEVER.

- 12.10.28. The following is declared an area of infection and guard area in terms of section 15 of Government Notice No. 641 of 1927.

#### Melsetter Native District.

#### (a) Area of Infection.

The farms Morgenson, Enhoek and Canterbury.

#### (b) Guard Area.

The farms Wolfscrag, Ravenswood, Woodstock, Heilrand, Landsdowne, Roemryk, Newcastle and Avontuur.

### POUNDS.

- 12.10.28 and 19.10.28. The pounds at Wallingford farm, Insiza, and at Wallacedale farm, Odzi, Umtali district, are abolished. (G.N. Nos. 682 and 697.)

### AFRICAN COAST FEVER.

- 19.10.28. Government Notice No. 551 of 1927, declaring the farms Clearwater and Finchley in the Gwelo district an area of infection, is cancelled. (G.N. No. 700.)



## Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

### AGRICULTURE AND CROPS.

- No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
- No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
- No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
- No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
- No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
- No. 374. Fibre Crops, by J. A. T. Walters, B.A.
- No. 388. Kudzu Vine, by H. G. Mundy, F.L.S.
- No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
- No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
- No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
- No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters, B.A.
- No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.
- No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.
- No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.
- No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 539. Barley Growing.
- No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
- No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.
- No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.
- No. 550. Onion Growing under Irrigation, by C. Mainwaring.
- No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
- No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
- No. 591. Maize Export Conference Proceedings.
- No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
- No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
- No. 601. Maize for Export, by S. D. Timson.
- No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 616. The Ground Nut or Monkey Nut, by C. Mainwaring.
- No. 627. The Growing of Potatoes in Southern Rhodesia (Revised), by C. Mainwaring, Agriculturist.
- No. 630. The Storage of Seed Potatoes, by H. C. Arnold.
- No. 634. Barley, by P. V. Samuels.
- No. 643. Noxious Weeds in Southern Rhodesia, by F. Eyles, Botanist.
- No. 650. Coffee Culture in Southern Rhodesia, by G. W. Marshall, Horticulturist.

- No. 651. Two Important Leguminous Crops: The Velvet Bean and Dolichos Bean, by C. Mainwaring, Agriculturist.
- No. 656. Tractor Notes, by A. W. V. Crawley, M.E., F.G.S.
- No. 657. Hay-making in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 663. The Use of Fertilisers and Manures in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.
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- No. 674. Top Dressing of Maize against Stalk Borer, by H. C. Arnold.
- No. 681. The Sunflower (*Helianthus Annuus*) (Revised), by S. D. Timson, M.C., Dip.Agric.
- No. 684. Warning to Maize Growers: Maize for Export.
- No. 694. The Edible Canna (*Canna Edulis*), by D. E. McLoughlin.
- No. 695. The Castor Oil Plant (*Ricinus* spp.), by S. D. Timson, M.C., Dip.Agric.
- No. 697. Results of Analysis of Samples taken under the "Fertilisers, Farm Foods, Seeds and Pest Remedies Ordinance" during the year 1927-28.
- No. 704. The Importance of Research on Pasture Improvement in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.
- No. 705. Suggested Cropping Programmes for Farms on the Sand Veld, by D. E. McLoughlin, Assistant Agriculturist.
- No. 706. A Farmers' Calendar of Crop Sowings, by C. Mainwaring, Agriculturist.
- No. 708. Witch Weed or Rooibloem (*Striga Lutea*)—a Serious Menace to Maize, by J. A. T. Walters, B.A., F.R.S.A., Agriculturist.
- No. 709. Sand Veld Farming and its Possibilities, by E. D. Alvord, M.Sc. (Agr.).
- No. 710. Monthly Reminders for the Farming Year, by the Division of the Chief Agriculturist.
- Botanical Specimens for Identification.
- Maize Grading Regulations.

#### REPORTS ON CROP EXPERIMENTS.

- No. 94. Second Report on Experiments, by J. H. Hampton.
- No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
- No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
- No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
- No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
- No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
- No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
- No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.
- No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.
- No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.
- No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.
- No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.
- No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.
- No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G. Mundy, F.L.S., and E. E. Wright.
- No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.



- No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.  
 No. 437. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1921-22, by H. G. Mundy, F.L.S.  
 No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.  
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 No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.  
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 No. 564. A Maize Rotation Experiment, by A. R. Morkel.  
 No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.  
 No. 608. Annual Report of Experiments, 1924-25, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.  
 No. 631. Bulawayo Experiment Station: Annual Report for Year 1925-26, by H. W. Hilliard.  
 No. 649. Annual Report of Experiments, 1925-26, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Manager.  
 No. 675. Bulawayo Experiment Station—Annual Report for Year 1926-27, by D. E. McLoughlin.  
 No. 683. Annual Report of Experiments, 1926-27, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Station Manager.  
 No. 685. Notes on Farm Practices at the Government Farm, Gwebi, by S. D. Timson, M.C., Dip.Agric.  
 No. 688. Report, 1923-24—1926-27, Gwelo Municipal Demonstration Stations, by D. E. McLoughlin.  
 No. 700. Further Notes on Farm Practice at the Government Farm, Gwebi, by S. D. Timson, M.C., Dip.Agric.

## TOBACCO.

- No. 605. Flue-Curing Tobacco Barns, Bulking and Grading Sheds, by P. H. Haviland, B.Sc. (Eng.), Acting Government Irrigation Engineer.  
 No. 607. Tobacco Seed Beds, by D. D. Brown.  
 No. 614. Notes on Installing the Johnson Patent Furnace, by B. G. Gundry, Office of Irrigation Engineer.  
 No. 615. The Culture of Virginia Tobacco in Southern Rhodesia—Field Management, by D. D. Brown.  
 No. 617. Dark Fire-Cured Tobacco, by E. M. Matthews, B.Sc., Tobacco Adviser. Fire-Curing Tobacco Barn, by the Tobacco Advisers.  
 No. 629. Notes on Flue Curing of Tobacco, by C. A. Kelsey Harvey.  
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 No. 644. Tobacco Baling Boxes, by B. G. Gundry, Irrigation Branch.  
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 No. 679. Tobacco Culture in Southern Rhodesia: The Harvesting and Curing of Virginia Tobacco, by D. D. Brown.



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## STATISTICS.

- No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.  
 No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.  
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 No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.  
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 No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.  
 No. 459. Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.  
 No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell.  
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 No. 543. Statistics of Live Stock and Animal Products for the Year 1924, by A. Borradaile Bell.  
 No. 580. Statistics of Summer Crops Grown by Europeans in Southern Rhodesia for the Season 1924-25, by A. Borradaile Bell, Statistician.  
 No. 595. Statistics of Live Stock and Animal Products for the Year 1925, by A. Borradaile Bell, Statistician.  
 No. 626. Statistics of Summer Crops grown by Europeans in Southern Rhodesia for the Season 1925-26, by A. Borradaile Bell, Statistician.  
 No. 646. Statistics of Live Stock and Animal Products for the Year 1926, by A. Borradaile Bell, Statistician.  
 No. 682. Agricultural Returns for 1926-7 : Preliminary Returns, by Thomas G. Gibson, Government Statistician.

## LIVE STOCK.

- No. 227. An Experiment in Beef Production, by R. C. Simmons.  
 No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.

- No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.  
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No. 381. From Breeder to Butcher; Cattle Feeding Experiment No. 8, by Eric A. Nobbs, Ph.D., B.Sc.  
No. 421. From Breeder to Butcher; Cattle Feeding Experiment No. 9, Government Experiment Farm, Gwebi, by E. A. Nobbs, Ph.D., B.Sc., F.H.A.S.  
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No. 468. From Breeder to Butcher; Cattle Feeding Experiment No. 13, by Eric A. Nobbs, Ph.D., B.Sc.  
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No. 701. Feeding Bullocks at Gwebi, by S. D. Timson, M.C., Dip. Agric.  
Arsenite Cattle Dip—How to Mix.

## DAIRYING.

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No. 612. Production of First-Grade Cream, by J. R. Corry, B.Sc.  
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No. 703. Dairy Buildings in Southern Rhodesia: Cow Byre—Type II., by B. G. Gundry, Irrigation Branch.  
No. 711. Dairy Buildings in Southern Rhodesia. A Small Farm Dairy, by B. G. Gundry, A.I.Mech.E.



## VETERINARY.

- No. 191. Scab or Scabies in Sheep and Goats, by Rowland Williams, M.R.C.V.S.
- No. 313. Obstruction in Sheath of Ox, by J. M. Sinclair, M.R.C.V.S.
- No. 474. Heartwater.
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- No. 436. The Possibility of Seasonal Forecasting and Prospects for Rainfall Season 1922-23, by C. L. Robertson, B.Sc., A.M.I.C.E.  
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Tea culture in Southern Rhodesia. Experiments by Messrs. Ward and Phillips at New Year's Gift, South Melsetter. The area shown in the photograph was planted in 1925 for seed production. (See editorial note.)



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## Editorial.

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*Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—  
The Editor, Department of Agriculture, Salisbury.*

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**Tea Culture in Southern Rhodesia.**—In July, 1927, we reproduced in this Journal some photographs of tea growing experiments which were being carried out at New Year's Gift, Chipinga, by Messrs. Ward & Phillips. We now publish a further series, which give some idea of the progress that has been made in the interim. Our frontispiece shows some of the bushes of the original plantings in 1925 used for the purpose of seed production. A comparison of the present illustration with the one reproduced in July, 1927, shows that the very satisfactory growth then made has been maintained. Photograph No. 2 shows part of an eight-acre block planted in February, March and April, 1927. The bushes have made good progress, and the growth is considered to be as good as most tea of the same age in India. Although two

seasons with rainfall below the average have been experienced, the bushes maintained their healthy appearance all through the dry months. This is very exceptional. In India, young tea bushes generally show signs of wilting during the dry, cold weather months.

The results of the experiments have satisfied Messrs. Ward & Phillips—the latter of whom has experience in tea growing in India—that tea can be produced successfully at New Year's Gift, and it is contemplated that eventually there will be 200 acres under the crop.

Further supplies of seed are being imported, and in January last 3,680 lbs. of a vigorous, hardy type were obtained from Assam. It is pleasing to note that with the kindly co-operation of the officials at Beira and Umtali the seed arrived in good condition. In spite of every care, however, only some 50 per cent. of the seed germinated. These young seedlings are now making fair growth, and Messrs. Ward & Phillips hope to begin planting out this month and to complete 100 acres before the end of March. Another consignment of 4,000 lbs. of seed has been ordered, and should arrive shortly. This will be sown in seed beds now being prepared, and should be ready for planting out in November, 1929, when Messrs. Ward & Phillips anticipate setting another 100 acres, making a total of 200 acres by March, 1930.

Messrs. Ward & Phillips have come to the conclusion that the disappointing results of seed germination which have been experienced from the beginning of these experiments are due to the fact that the seed arrives here and is planted out of its normal season. It is, for instance, produced in the Northern Hemisphere, where it would be planted in the cold season. It arrives here in December-January, during our wet, warm months, and is, therefore, planted under abnormal conditions. Messrs. Ward & Phillips hope for much better results with their own acclimatised seed.

We quote the following remarks by Messrs. Ward & Phillips *in toto*:—

“ We have recently been plucking leaf from the area planted in 1927, and have manufactured this in a very primitive manner, and have produced a really good tea. We are confident that with a fairly well-equipped factory we shall





Tea growing at New Year's Gift, South Melsetter. Showing seed beds with "Daincha" (a leguminous plant) for shade.



Messrs. Ward & Phillips' homestead at New Year's Gift.







Tea growing at New Year's Gift, South Melsetter. Part of an area planted in 1927; bushes are now being plucked.





turn out tea of the finest quality. At present a small factory is under construction, and locally-made machinery is being installed which will suffice for a year or two. In 1930, when the larger area begins to yield, it will be necessary to erect a more up-to-date tea house and to import the latest machines from England or India.

“ Rainfall is on the short side, but humidity or some other factor appears to be making up for this. We do not anticipate a large yield per acre, such as 800 lbs., which is frequent in parts of India, but we do expect a crop of some 400 to 500 lbs. per acre, which, if sold in the Colony at a moderate price, should leave enough margin of profit to make the industry an attractive one to those with a little capital to invest.”

We feel sure our readers will join us in wishing the pioneers of the tea growing industry in Rhodesia success in their future operations.

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**Tanganyika Agricultural and Industrial Exhibition, 1929.**—We have been asked to draw attention to this exhibition, which is to be held in Dar-es-Salaam in September, 1929. An influential committee has been formed, and every endeavour is being made to make this initial exhibition a success. Agricultural products will be a prominent feature of the exhibition, and will be fully representative of the farming activities of the Colony. Sections are being arranged for cattle, sheep, pigs, coffee, maize, wheat, sisal, cotton, tobacco, tea, sugar and sugar cane, dairy products, poultry and forestry exhibits, a list which demonstrates the wide range of crops which can be grown in this fertile Colony. The address of the secretary is The Tanganyika Estate Offices, Post Box 220, Dar-es-Salaam.

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**Gas Producer Plant for Tractors.**—The question of evolving an efficient producer plant for attachment to tractors is receiving considerable attention at the present time in Europe.

A series of trials are now being carried out by the Compound Gas Company, Caversham Road, Reading, England,

with a gas producer working on wood fuel as opposed to charcoal, and it is of interest to note that a consignment of average Rhodesian timber was recently despatched to this firm by the Department of Agriculture in order that a test could be carried out to determine whether our native timber could be efficiently used for this purpose.

These trials are being watched on behalf of this Government by a qualified engineer, with practical knowledge of the conditions obtaining in this Colony, who will submit his report in due course.

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**Pedigree Cattle for Rhodesia.**—Mr. W. Fleming, Stock Adviser, Department of Agriculture, left Capetown on the 23rd November for England for the purpose of purchasing pedigree cattle for Rhodesian farmers and for the Government farms. Mr. Fleming has commissions to purchase approximately one hundred head, which, if duly forwarded, will be the largest consignment that has ever entered the Colony. Many of the animals to be purchased will be acquired under the scheme whereby the Empire Marketing Board and the Government of this Colony jointly bear the expenses of freight and railage. All the cattle purchased have to undergo a period of 14 days' quarantine in London and 30 days in Capetown. Mr. Fleming is expected to be away about three months.

The mission on which Mr. Fleming is engaged is of the utmost importance to the cattle industry of this Colony. Our greatest need is bulls of good quality, and although present purchases will by no means meet immediate requirements, they will help forward appreciably the very necessary work of grading up the cattle of the Colony.

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**Wheat in Rhodesia.**—Farmers will be pleased to note that the Government has approved of a rebate or refund of the Customs duties on imported wheat purchased by a *bona fide* miller or milling company when such wheat is used and blended with wheat grown and produced in this Colony in the proportion of not less than 20 per cent. This decision of



the Government is made public in Government Notice No. 709, of 26th October, which we publish, with other notices, at the end of this Journal.

The object of the concession is, of course, to encourage the growing of wheat in Rhodesia, a crop which has made little progress here. At the present time practically all the flour consumed in this Colony is obtained from outside sources, our imports of wheat and flour in 1927 amounting to no less a sum than £82,724. Unfortunately, all attempts to establish wheat as a summer crop in Rhodesia have failed, owing to the prevalence of rust, and such wheat as is produced is grown during the dry season either under irrigation or in the moist vleis lands. We have no figures of the acreage planted to wheat this year, but in 1927 9,673 bags were grown on 3,268 acres, a yield which should be considerably improved.

It is to be hoped that the rebate now granted will stimulate the production of wheat in this Colony and render us less dependent upon other countries for our supplies of this necessary cereal.

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**Tobacco Culture in Southern Rhodesia.**—We would specially draw the attention of tobacco growers to the report which we publish in this issue of the Journal of an address delivered by the Chief Tobacco Expert to the Darwendale and Trelawney Farmers' Association. A great deal of what Mr. Brown told his audience has appeared in articles written by him in this Journal, but, unfortunately, his advice has often been disregarded. The gist of his remarks can be summed up in the words, "The aim of every tobacco grower should be to produce quality and not quantity. Every endeavour should be made to increase the acre yield and to reduce the cost of production." To achieve this most necessary object it is essential that the greatest care be paid to every phase of tobacco growing. A careful perusal of the address, which we reproduce, will show how mistakes may be avoided. It should need no word of ours to emphasise the patent fact that if we are to retain and consolidate our footing in the British market we must produce the tobacco which the manufacturers require. More than ever is it necessary that quality must be the desideratum.



Our advice to growers is to glean all the authoritative information they can on the growing and curing of tobacco and to put it into practice. The Department of Agriculture is out to help in every way possible, and asks that advantage be taken of the facilities which it provides in the way of expert advice. The articles which have appeared in this Journal on the subject of tobacco growing are all available in bulletin form, and we shall be only too pleased to send a copy to anyone who applies for it.

We have no inside information which we can transmit regarding the tobacco situation. The stocks of Rhodesian leaf on hand in England are gradually being reduced, but it will be some time before the market can absorb all that is lying in bond. There is, however, reason for believing that Rhodesian tobaccos are finding favour with the smoking public, and we are convinced that, providing we maintain the quality of our leaf, the present marketing difficulties will disappear within a reasonable time.

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**The Keeping of Farm Accounts.**—Much has been written and said on this subject during the last few months—a sign, in our opinion, that farmers, as a whole, are realising more and more the necessity for exercising the same care and prudence in their farming operations as is customary in other businesses. The time when a farmer could regard his bank pass book as a sufficient record of profit and loss has long since passed, and nowadays he must, if he hopes to attain any measure of success, regard the result of every individual operation in the field, and upon his pocket, with equal care.

Although the article which appeared in the July issue of this Journal has attracted considerable attention, and, to our knowledge, has been given practical effect to in a number of instances, there are undoubtedly a number of farmers to whom the idea of keeping books is repugnant, either from lack of time, inclination or training. A few who are located near the large towns can, and do, we think, send their books into town periodically to be written up by professional accountants, but this would probably be found impracticable to the very large number who are not so favourably situated.

A suggestion has been made by two Farmers' Associations that a qualified accountant should tour from farm to farm, visiting each in turn for a day or two every few months. We believe this would, if the farmer himself is willing to spend a few minutes each day in keeping very simple primary records of his labour, etc., enable an accountant to write up the farmer's books for him, and give him every year detailed accounts of his working costs and profits, prepare his income tax returns, and show him his exact financial position.

The farmer would, in addition, have the advantage of periodical advice in questions of finance and the like, particularly at the beginning of every season when framing his "budget," and although we do not think that a responsible accountant would go so far as to recommend what farming operations should be undertaken—as was recently suggested by a writer on this subject—he could, and should, see that the proposed programme is in accord with the farmer's available resources.

There is undoubtedly a great need amongst farmers for assistance on these lines, especially in the case of partnerships and of farms worked under management, since it should give all the advantages of accountancy without trouble or prohibitive cost.

We do not, of course, wish farmers to become involved in expense which they can ill afford. We would prefer to see all farmers keeping a record of their farming transactions on the lines set out in the article written for this Journal by the Accountant of the Department of Agriculture. Failing this, we do think a suggestion such as that outlined has much to commend it, and it is well worthy of consideration, possibly on a co-operative basis. Whatever method is adopted, we are convinced that the keeping of proper records by farmers is a matter of the utmost importance, and we trust that the small beginning which has been made will grow until it becomes universal throughout the Colony.

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**Feed for Stock during Periods of Scarcity.**—The delay in the arrival of the rains this season, and the very serious losses of live stock which have occurred



in many parts of the Colony owing to the lack of grazing and adequate supplies of winter feed, should provide an incontestable argument as to the necessity for the conservation of food supplies for use during the dry months. Farmers are disposed to rely upon the weather breaking in October or thereabouts, and thus providing them with ample grazing a week or two later. Frequently this does not happen, and when these conditions follow a season of short rainfall such as that of last year, live stock are subjected to terrible hardships and owners to very serious financial loss. Deaths from poverty have been particularly prevalent amongst pregnant cows, which, owing to inadequate feeding, have been unable to stand the strain of calving. The calf also has succumbed, and the total financial loss is considerable.

Failing the provision of adequate supplies of food for the dry months, the only alternative is to move the stock to areas where there are sufficient supplies of water and grazing. This is usually possible, but, unfortunately, only too frequently has it happened that arrangements for the transfer have not been made until heavy losses have occurred. This again shows a lack of foresight, and emphasises the necessity for taking time by the forelock.

The subject of providing winter feed for stock is a hardy annual in this Journal. Not only have pages been written on the subject, but the officers of the Department have time and again, in lectures at various centres, preached this doctrine. It is feared that much of what has been written and spoken has failed in its object, otherwise we should not have to record the deplorable losses of the last few months.

There are various ways in which the necessary foods can be supplied. During the five or six months of the rainy season the average Rhodesian farm usually carries a wealth of natural pasturage far in excess of the requirements of the stock maintained. These grasses, if cut and cured into good hay, provide the cheapest form of dry fodder which the farm can produce. The Chief Agriculturist wrote a valuable article on this subject in the *Rhodesia Agricultural Journal* of February last, with which were given illustrations of veld grasses suitable for conversion into hay. Those farmers who have mislaid their copy of the Journal—we are afraid there



are a few—can procure a copy of this article in bulletin form upon application to the Department of Agriculture.

In addition to hay, cattle, especially dairy stock, naturally need some succulent food during the dry season, and first and foremost in this category comes ensilage, an article on which appeared in the last issue of the Journal. No farm should be without its silage pit, which, if not required one year, can be kept intact without damage to the contents for several seasons. Majortas, which are easily grown under the maize crop, provide a magnificent succulent feed to be used in conjunction with hay. Then there are pumpkins and sweet potatoes, particularly for the dairy and pig farmer, and the new crop, edible canna, which is coming into prominence. We might here mention that considerable supplies of canna tubers have been issued by the Department during the last two or three months for trial in various parts of the Colony, but there are no more available now. These are but a few of the measures which can be taken to ensure that stock are not only kept alive during the dry months, but are maintained in good condition, for any setback at this time has a most deleterious effect on the future well-being of the animal.

The subject is of prime importance, and we trust that the few lines now written will have the effect of focussing attention upon it. Farmers are about to plant their crops for the coming season, and there should be none who does not include in his cropping programme adequate provision for his stock.

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### **HORSE-SICKNESS INOCULATION.**

A limited quantity of virus-vaccine (Bevan's method) for the inoculation of mules, and horses under five years of age, is available, and will be issued until the onset of the horse-sickness season. The price of the vaccine is £1 per dose, cash with order.

As the quantity available is small and the time for inoculation limited, applications should be made as early as possible to the Director of Veterinary Research, Salisbury.

## Turkish Tobacco Culture in Southern Rhodesia.

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By D. D. BROWN, Chief Tobacco Expert.

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Turkish tobacco culture is a highly specialised branch of farming requiring constant care and close attention throughout the entire season.

The acreage planted to Turkish tobacco in this Colony has remained fairly constant during the past few years.

Up to the present time this type of tobacco has been sold to manufacturers in the Union of South Africa, where the demand for our product has not shown any great increase.

The present production just about balances with the demand, and further production on an extensive scale should therefore not be contemplated unless growers are assured of a market for their tobacco.

The following notes on Turkish tobacco culture are furnished in response to numerous requests for information relating to the growing and handling of the crop.

**Climate.**—Turkish tobacco is sun-cured; it is therefore essential that there be practically no rainfall during the curing period. The rains should normally cease about one month after the tobacco is transplanted. The occurrence of heavy rains when the tobacco is reaching maturity will cause a great deal of damage through washing the gum out of the leaf, thus rendering the cured product thin, papery, and lacking in body, flavour and aroma. An excessive degree of moisture in the atmosphere when the tobacco is out on the curing racks will also be detrimental to the colour and quality of the leaf. In order to produce Turkish tobacco of good quality the rainfall should occur during the transplanting season, and continue through the period of early growth. During the ripening, harvesting and curing periods the

weather should be bright and with no rainfall. There should be at least two months' interval between the last rainfall and the occurrence of the first frost in order to allow the plants to mature and the leaf to be harvested.

**Soils.**—Turkish tobacco has been found to grow well on the red clay loams derived from diorite, dolerite, schist and banded ironstone formations. Sandy loams of granitic or sandstone origin are also suitable, provided they are sufficiently fertile. The “contact” soils are also sandy loams, but are generally finer in texture, more fertile and produce heavier yields of tobacco. This type of soil is found on the line of contact between a light and a heavier-bodied soil; the “contact” soils generally used are granite-diorite, granite-dolerite, granite-schist, granite-banded ironstone and sandstone-basalt.

When selecting land for the crop, due attention must also be given to the nature of the sub-soil. The character of the sub-soil has an important influence on the yield and quality of the leaf. If the sub-soil is impervious the tobacco will, in certain seasons, suffer damage through the land becoming waterlogged. Should the sub-soil, on the other hand, be very porous, the plants may suffer from drought in seasons of light rainfall. Soil underlain by a very porous sub-soil will also not be retentive of artificial fertilisers.

On shallow soils with a stiff clay sub-soil there is a tendency for the leaf to be dark in colour. The most suitable sub-soil underlying the granitic sandy soils is reddish in colour, and contains clay, sand and gravel in suitable proportions. In some localities, where a bluish coloured clay sub-soil is found, tobacco growing is not recommended, as the tobacco is liable to suffer from “wet feet” when planted on land underlain by a sub-soil of this type.

Any fields selected for tobacco culture should be on a gentle slope with a good natural drainage and in a sheltered locality.

**Seed Beds.**—Turkish tobacco seed beds are prepared and managed in the same manner as Virginia tobacco beds. The Turkish tobacco seed beds are sown from the beginning of December to the middle of January. The area of seed beds required depends upon the extent of the intended acreage—



100 square yards of seed bed are required for each acre to be planted.

The favourite varieties of Turkish tobacco seed sown in this Colony are Soulook and Kavalla. The handling of tobacco seed beds was exhaustively dealt with in the *Rhodesia Agricultural Journal*, September, 1926, issue.

**Preparation of the Land.**—It is essential that after being transplanted the tobacco should make rapid and continuous growth. The field should therefore be properly prepared and the soil should be brought into as perfect tilth as possible.

In preparing virgin soil, it is desirable that the land be stumped, cleared and ploughed during the preceding rainy season. Stumping is best done during the months of the heaviest rainfall, when the soil is thoroughly soft. A point to be remembered when stumping and clearing new land is that the timber should be drawn off the field, not piled there and burnt. If burnt on the field, the heavy ash residues left on the land will give rise to an uneven crop of tobacco. The newly-cleared field should be ploughed—usually about March and April—while the grass and vegetation are still green and full of moisture, and before the soil becomes too dry or hard.

When handled in this manner it will be found that the land can be more thoroughly ploughed; all vegetation turned under is more readily decomposed and converted into humus, and the soil is rendered more friable and retentive of moisture. After lying fallow during the winter months, the land should be ploughed and cross-ploughed, and then harrowed with a heavy disc harrow, being finally brought into a good tilth by means of drag harrows.

Generally speaking, the tobacco soils of Southern Rhodesia are inclined to be rather shallow, and great care should therefore be taken in the ploughing operations, so that only the top soil is turned over by the plough. A quantity of the sub-soil brought to the surface through ploughing too deeply will have a detrimental effect on the crop.

Land which has already been under crop should, if possible, be ploughed as soon as the crop is harvested, so that a certain amount of soil moisture may be conserved and also to assist in the destruction of insect pests which may be

hibernating in the soil. Such soils should be ploughed again during the early part of the following season, and brought into good tilth just prior to planting.

With all soils, whether virgin or previously cropped, it is imperative to secure a good tilth before planting. Whenever possible, the final ploughing and harrowing should be made when the soil has been moistened by showers of rain which fall at the commencement of the wet season, since any weeds coming up at this time will thus be destroyed, and subsequent weeding will be reduced to a minimum.

Suitable drains should be made where necessary to lead off storm water. Around each field a strip of ground (say 20 feet wide), kept free from weeds and grass, will assist in checking insect pests. When the outer edges of the fields are straight, and suitable pathways are left at convenient intervals across the field, a good deal of time and damage will be saved during the working of the crop.

**Manurial Treatment.**—Until exhaustive experiments have been carried out with the fertilising of each type of soil used for Turkish tobacco culture, it is not possible to set down any definite recommendations on this subject. Owing to the diversity of the types of soil, their varying degrees of inherent fertility and lack of uniform treatment accorded in regard to tillage and cropping, it is only possible to deal with the fertilising of the crop in a general sense.

A big coarse growth is not desirable, therefore the application of fertilisers or manures is not recommended where the natural fertility of the soil is sufficient to produce a good crop of Turkish tobacco. The clay loam soils usually require no manurial treatment. On sandy loams a dressing of fertiliser is applied at the rate of 200 lbs. per acre, the formula of the fertiliser generally used being 20 per cent. phosphoric oxide, 8 per cent. nitrogen and 10 per cent. potash.

When a lower grade fertiliser is used, the rate of application is proportionately greater than 200 lbs. per acre.

Kraal manure may be applied in place of artificial fertilisers, the dressing being broadcast at the rate of about eight tons per acre. An application of phosphates may also be used in conjunction with the kraal manure.



Any application of kraal or farmyard manure should be made well in advance of the transplanting season. The manure should be old and well rotted before being applied broadcast and ploughed under.

On light, sandy soils, which have a low nitrogen content, phosphates must be used with discretion, as excessive applications may cause premature ripening or "firing" of the leaf, especially during seasons of drought.

**Time for Transplanting.**—When the seedlings are about six inches in height they are ready for transplanting. Tobacco of desirable quality is rarely produced from unsuitable plants, and the yield in most instances is disappointing. Growers sometimes use plants which are less than four inches in height; these are too small, and fail to make satisfactory growth unless the weather conditions are particularly favourable. A few hours of hot sunshine immediately after transplanting will either kill or seriously retard the growth of such small plants, while a heavy fall of rain may cause them to become buried in the soil. On the other hand, overgrown, tough and woody plants are often planted in order to complete the intended acreage. As a rule lanky plants do not make satisfactory growth; the flower head develops while the plant is still too small, the leaves remain undersized and do not ripen normally.

The best results can hardly be expected unless the tobacco is transplanted during the most favourable portion of the season. The highest returns from Turkish tobacco in this Colony are usually obtained from the crop which is transplanted during the latter half of January and up to the end of February. A factor having a direct bearing on the yield of tobacco is the stand of plants per acre; the presence of blanks in the rows reduces the number of plants, and, consequently, the possible yield. An imperfect stand is mainly due to unfavourable weather conditions, insect pests, disease or bad planting. Fresh plants should be transplanted to replace those which fail; such filling in should be carried out as soon as possible after the necessity arises.

It is not advisable to fill in blanks when the adjacent plants have attained a fair size, for tobacco plants transplanted under these conditions fail to make satisfactory growth, being dwarfed and overshadowed by the bigger



plants; hence the importance of expediting the filling in of blanks. The average stand of plants should be in excess of 75 per cent. if profit is to result from the culture of tobacco.

Immediately before transplanting, the field may be marked off at the requisite intervals between the rows, which, under Rhodesian conditions, are spaced from 18 inches to 24 inches apart. Shallow furrows may be made by using a single row cultivator from which all but the back shovel has been removed. The common method of marking off the field and planting the tobacco is by the use of a long wire notched at eight-inch to nine-inch intervals.

When using a wire the field is marked off every 18 inches to 24 inches down one side of the field, and corresponding marks are made where the other end of the wire will reach when pulled taut. After the wire is in position a tobacco seedling is planted opposite each notch, care being taken to keep all plants at the back of the wire. When the row is completed the wire is moved forward to the next peg, and this is continued until the end of the field has been reached. By this method the marking off and planting out are carried on simultaneously.

**Method of Transplanting.**—Transplanting is best done on dull, misty days, with frequent showers of rain, and every opportunity of transplanting the crop during such weather should be fully utilised. It is seldom, however, that the whole of the crop can be transplanted under these ideal conditions; the grower often has his planting operations controlled by the advent of rain, often in the form of local showers, and the moisture present in the soil. It is not wise to transplant tobacco unless the soil contains sufficient moisture to prevent excessive wilting of the young plants. Provided the soil is sufficiently moist, tobacco may be transplanted throughout the day, though the best time is during the afternoon, as the plants are then subjected to less intense heat immediately after being planted out.

A short, pointed stick is used for making suitable holes in which to place the plants; the seedling is carefully inserted and then the soil around it is firmly pressed down. The tap root of the plant should on no account be bent up when transplanting is being carried out; plants with a bent tap root

seldom make satisfactory growth. The heart of the plant should also not be placed beneath the surface of the soil.

**Cultivation.**—As soon as the tobacco plants have become established in the field, cultivation should commence. The first cultivation is shallow, so that the young plants will not be injured or disturbed. When the tobacco begins to grow properly a deeper cultivation should be given in order to stir up and aerate the soil. Subsequent cultivation should be shallow. The crop must be cultivated as often as is necessary to keep the field free from weeds and to preserve a good mulch on the surface of the soil.

Hand hoes and light single-row cultivators are used until the plants are about twelve inches high. Ordinary cultivation then normally ceases when the plants have attained this height. Hand weeding, however, is still continued if necessary. A light surface mulch should be maintained.

Just before the plants begin to flower all cultivation should be discontinued, as disturbing the soil after this period will tend to delay maturity and cause dust to adhere to the leaf.

**Priming.**—The small leaves at the base of the plant should be removed and discarded before the flower head appears.

Turkish tobacco does not require to be “topped.” It is not usual for “suckers” to make their appearance.

Heavy rains falling when the plants are nearing maturity may sometimes induce the growth of “suckers.” Should this occur it will be necessary to remove any “suckers” produced. Any leaves affected by “white mould” should also be primed off the plants and destroyed.

**Harvesting.**—Turkish tobacco is harvested by the single leaf method; the leaves are picked as they ripen. Great care must be taken to harvest the leaves in the proper stage of ripeness, as uniformity in the cured product largely depends on this operation. If the tobacco is harvested too green the cured leaf will usually retain a greenish colour. On the other hand, if the tobacco is over-ripe the cured leaf will be thin, brittle and lacking in body and colour.

When ready for harvesting the leaf has a flaccid feel, a somewhat transparent appearance, and the green is replaced



by a yellowish coloration. Tobacco grown on very fertile soil or on land too heavily manured will show indications of ripeness by yellow flecks on the leaf and by brittleness of the veins and mid-rib.

The first picking usually takes place about the time when the first flowers open. The lower leaves are the first to be harvested, and the top leaves are the last to ripen. Harvesting is best done early in the morning, when the true colour of the leaf is more easily determined. The leaf then is not wilted, and, consequently, it parts from the stem more readily and with less damage. No tobacco should be reaped immediately after heavy rains, as the leaf will be thin and papery through the gum and oil having been washed out. In the event of heavy dews falling overnight the tobacco should not be picked until the leaf has become somewhat dry. Ripe leaf only should be picked; usually about four leaves at a time are ready for harvesting from the plant. Several pickings are required before the whole crop is harvested.

As the tobacco is harvested it is placed in boxes or crates, care being taken not to bruise the leaf or leave it exposed to the sun. When placed in the boxes or crates the tobacco should be properly packed, with the butts facing the same way. The tobacco is then conveyed to the stringing shed, where the leaves are threaded on strings.

**Stringing.**—The operation known as “stringing” also includes grading the tobacco. The operator has a thin, flat needle about 15 to 18 inches in length, through which a good quality cotton string is threaded.

The leaf is graded according to size and colour before it is threaded. The needle is passed through the mid-rib of each leaf separately, and about one half inch from the butt. When the needle is completely filled with leaves it is threaded with the string; the tobacco on the needle is then carefully moved along on to the string. The needle is again filled, and the operation is continued until the string has been threaded with the full complement of tobacco. The leaves should all face the same way. Badly damaged and diseased leaf should be thrown out. Tobacco which is bruised or otherwise damaged should be threaded, cured and baled separately.

The next operation is to attach the loaded strings to laths or wooden frames specially constructed for the purpose.



The advantage of the latter is that less handling is required, for as many as eighteen strings can be tied to one of these frames, whereas a lath holds only one string of tobacco. All tobacco must be threaded and placed in the wilting room the same day on which it is harvested, as, if left over until the following day, the leaf is liable to ferment and become worthless through discoloration.

**Wilting.**—As the laths or frames are filled with tobacco they are hung up on suitably constructed tiers in the wilting room. The laths should be placed at suitable intervals along each tier. The spacing between each lath is determined by the size of the tobacco being handled at the time, the larger leaf requiring a greater spacing than the smaller leaf. In either case the laths should not be placed close enough to each other to allow the leaves to touch the tobacco on adjacent laths. Should the tobacco be too closely packed on the tiers, damage through fermentation may result.

The wilting room should be cool, fairly dark, with a hard floor free from dust. The building should also be weather-proof and capable of retaining the desired degree of humidity, which is controlled by the introduction of moisture and by ventilation.

The walls are usually of brick or “pole and dagga” construction. The wilting room should have a thatched roof, in order that the temperature inside the shed may be kept uniform.

The best results can only be obtained when the temperature and humidity of the wilting room are under complete control. If the temperature is too low the desired changes will not take place, and, if too high, the leaf will wither quickly and fail to take on the proper colour. Practical experience has demonstrated that a temperature of 70° F. is conducive to the best results. Should the atmosphere of the wilting room be allowed to reach saturation point the excessive moisture will cause the tobacco to become damp and clammy from condensation, and there is every possibility of the leaf becoming damaged from mildew. If the atmosphere is too dry, the leaves wither prematurely, and it will not be possible to cure out the green colour which will remain in the leaf.

Optimum results are possible when the wet bulb of the hygrometer registers  $2\frac{1}{2}^{\circ}$  to  $3^{\circ}$  below the dry bulb. If the difference in the reading between the wet and the dry bulbs be greater than  $3^{\circ}$ , more moisture should be introduced into the wilting room. On the other hand, should the difference be less than  $2\frac{1}{2}^{\circ}$ , the humidity must be reduced by ventilation.

The duration of the wilting process is governed by the type of leaf which is being harvested. Leaf harvested when properly ripe should only remain in the wilting room for two or three days. Green leaf requires more than three days, while over-ripe leaf should be sufficiently wilted in one or two days. Tobacco which is very much over-ripe may, with advantage, be placed direct on the curing racks immediately after it is strung on the laths. In the latter instance the tobacco must be kept covered for several days in order to protect the leaf from the direct rays of the sun.

Tobacco harvested a little on the green side should not be kept in the wilting room for a longer period than four days, when it should be placed on the curing racks and suitably covered for several days to complete the yellowing stage.

Turkish tobacco should normally remain in the wilting room until the colour of the leaf changes to a pale greenish-yellow tinge. If removed too soon there is a danger of the leaf remaining a green colour, which will not be eliminated during subsequent curing. When left too long in the wilting room, and until the yellow colour is too pronounced, moisture accumulates on the surface of the leaf, causing discoloration and also injury to the texture of the leaf.

The management of the wilting process requires considerable skill and experience. Damage caused through ignorance or lack of supervision cannot be rectified after the tobacco has been in any way mishandled. It is only by actual experience that the grower will be enabled to handle the tobacco correctly and prevent any damage being done to the leaf in the wilting process.

**Curing.**—From the wilting room the tobacco is conveyed to the curing racks. These racks are constructed in a sheltered locality in close proximity to the wilting room and storage sheds. If not naturally well sheltered, it is advisable to enclose the curing racks by artificial shelters. An effective



shelter may be provided for by fixing posts at fairly close intervals round each side of the curing site. Ordinary plain fencing wire is then secured to each post, one strand being about six feet above ground level and another strand about 18 inches above ground. Long grass or reeds are then laced to these wires to form a fence. An entrance to the enclosure should be left on the side away from the prevailing wind.

The curing racks are constructed of light bush poles supported on short posts let vertically into the ground; plain, heavy gauge wire may also be used in place of the bush pole horizontals. The racks may contain either one or two tiers. Where only single tier racks are being erected the side rails should be about two feet above ground level. With double tier racks the lower tier is about 2 feet above ground and the upper tier approximately  $3\frac{1}{2}$  feet to 4 feet. high. At the ends and at intervals down the centre of each curing rack, posts, standing about six feet high, are placed to carry a ridge pole to support the canvas used for covering the tobacco at night, and also during light showers of rain.

When curing frames are used in place of laths, it is advisable to have single tier racks. The use of these frames makes it possible to remove the tobacco from the curing racks at night and on the appearance of rain during the day. After removal from the racks, the frames are hung up in a suitably constructed shed until the following morning or until after the rain has ceased, whatever the case may be.

When laths are first placed on the curing racks they are spaced as closely as possible without the leaves touching, and if the sun is excessively hot, the tobacco is covered over with hessian, cheese cloth or grass mats to prevent the leaf from sunburn.

The following day the laths are placed four inches apart, and the third day they are spread out until the space between each lath is six inches. No further increase in the spacing is made, the laths remaining at six inch intervals until the leaf is dried out. If the laths are too widely spaced at first, the tobacco is liable to dry prematurely and cure green.

During the curing process the leaf gradually changes from a pale yellow to a bright yellow, and as the tobacco gradually dries out the colour slowly changes to a yellowish-brown or bronze, which is the colour desired in Turkish



tobacco. A clear yellow colour in the cured tobacco usually indicates that the leaf is lacking in body, flavour and aroma. A very dark colour is generally observed when the tobacco is harvested too green, or when it has been exposed to excessive moisture during the curing period. The length of time required to complete the curing depends on the quality of the leaf and the climatic conditions. Thin, papery leaf will cure much more rapidly than leaf of heavy body. The curing will be accomplished in less time when the weather is bright and warm than during cool, cloudy weather. In Southern Rhodesia, the average time required to complete the curing is approximately one month.

The tobacco should always be protected from dew and rain, the usual protection being afforded by canvas coverings when the tobacco is cured on laths and by removal to a weather-proof building when the leaf is cured on frames.

**Handling after Curing.**—There are two methods of treating the cured tobacco before it is graded and baled. One method is where the strings of tobacco are cut from the laths and the two ends tied together to form a wreath. These wreaths are hung up under the ceilings of the sheds until the whole crop has been cured. They are then taken down and the leaf is graded preparatory to being baled.

The above-mentioned method is especially suitable for handling tobacco which has been cured on frames. The other method is to bulk the tobacco in stacks of convenient size. When bulking the tobacco the leaf should be soft and pliable and laths should be removed from the curing racks during the early morning, when the tobacco can be handled without damage. Each lath is then placed in position to form the bulk.

The bulks should be examined daily to ascertain the condition of the tobacco. Should the tobacco become overheated, the bulks must be broken down and the leaf exposed to the air for a short time before the tobacco is re-bulked.

The condition of the tobacco when being bulked is important. If the leaf is too dry it will become damaged by breakage, and, if too moist, there is a danger of the leaf being ruined through mildew.

The bulks should be built on wooden platforms raised about one foot above floor level to allow a free circulation of

air under the stacks. Should the shed have a wooden floor with plenty of ventilation underneath, the tobacco can be placed on the floor, thus dispensing with the use of platforms. The bulks are usually broken down and the tobacco re-stacked once every fortnight, and, if properly handled, the leaf will improve in colour and develop the flavour and aroma which are characteristic of Turkish tobacco.

**Grading.**—Rhodesian-grown Turkish tobacco is divided into five grades, corresponding to each picking from the plant. The leaf harvested from the bottom of the plant is placed in No. 1 grade, the next picking higher up the plant is the second grade, and so on up to the top leaves, which are placed in No. 5 grade.

Each of the five grades is sub-divided according to size and colour of the leaf. Before grading can be commenced, the tobacco must be brought into condition, usually by being placed in a cellar or conditioning pit, where the leaf can absorb moisture and become soft and pliable. The strings are then roughly sorted according to size and colour, after which all defective leaf is removed and placed in boxes or baskets until baled as loose leaf, which realises a lower price. The strings of graded tobacco are bulked on small platforms until a sufficient quantity is available for baling.

**Baling.**—When sufficient tobacco has been graded, baling can be proceeded with. The strings are cut to correspond with the length of the press box, which is usually 24 inches long. The width of the box is 16 inches, and the depth from 30 to 36 inches.

A strip of hessian is placed along the bottom and up one end of the press box, leaving an overlap of two feet to cover the top of the bale. The strings are packed with the leaf butts facing outwards and the tips towards the centre. The bottom layer is first completed, and each successive layer is packed in similar fashion until the press box is filled. The pressing board is then placed on top of the tobacco, and pressure is applied until the desired density is obtained.

The partially-completed bale is kept under pressure for a short time; when the tobacco is sufficiently set the pressure is released and more tobacco added. Pressure is again applied and the operation is repeated until the bale is of the required



weight. When it is the correct weight, the bale should be allowed to remain under pressure until properly set, usually after several hours. Care must be exercised in the application of pressure during the baling. If pressed too tightly, the tobacco will be bruised and will become a compact mass difficult to separate; on the other hand, should insufficient pressure be applied, the bales will dry out and become unshapely.

When removed from the press box, one end, as well as the top and bottom of the bale, is covered with good quality hessian. The hessian is then sewn firmly in position by strong cord, which is drawn from the top to the bottom of the bale in wide stitches, continuing until the two open sides and end have been properly laced.

The cord is then securely tied, and the loose end, about three feet long, is tucked away under the hessian. The bale is then weighed and labelled according to the weight, grade and quality. The bales of tobacco are then stored until transported from the farm. The standard weight of a bale of Turkish tobacco is approximately 80 lbs.

During storage, the bales require regular inspection, and should any bales become hot through the tobacco being packed in high condition or through exposure to excessive moisture, the laces should be slackened, the bales placed on end and the contents opened out in order to allow air into the middle of the bale. After being sufficiently aired, the bales are again laced up and packed away.

Before leaving the farm the tobacco should be fully encased in hessian, by sewing a strip of this material round both open sides and end of the bale.

The fermentation process follows the baling, but as Turkish tobacco produced in this Colony is generally shipped direct to the manufacturer as soon as baling is completed, the fermentation of the tobacco is carried out by the manufacturer.

In conclusion, it cannot be too strongly emphasised that producers of Turkish tobacco should endeavour to produce a commodity of superior quality, for there is no demand for inferior leaf.



**SUMMARY.**

1. Take every care with the seed beds, and raise good, strong, healthy seedlings; good crops are seldom produced from inferior plants.
2. Prepare the land thoroughly before planting the crop.
3. See that transplanting is carefully carried out.
4. Fill in all blanks with strong, vigorous plants, and endeavour to have a 100 per cent. stand.
5. Proper cultivation and clean fields assist yield and quality.
6. Prime the plants when necessary.
7. Harvest tobacco when it is properly ripe; when picked too green the leaf is of low value.
8. Do not handle badly diseased or damaged leaf; throw it away and make room for the sound tobacco.
9. Handle the tobacco with care; bruising and sun-scald cause a reduction in value.
10. Sort the leaf carefully before stringing; it cannot be done afterwards.
11. Watch the wilting of the tobacco; damage done at this stage cannot be rectified later.
12. Provide suitable buildings and facilities for handling the tobacco to the best advantage; waste reduces profits.
13. Protect the leaf from damage on the curing racks.
14. Inspect the bulks and turn the tobacco regularly.
15. Grade the leaf correctly; mixed grading will mean a lower selling price.
16. Get the leaf into proper condition for baling.
17. Examine the bales whilst they are being stored; take out hot bales and air the tobacco.
18. Produce *quality* rather than *quantity*.

# Gwelo Municipality Demonstration Stations.

REPORT, 1927-28.

By S. D. TIMSON, M.C., Dip.Agric.

The season under review was most unfavourable, for although excellent and well distributed rains fell at the commencement of the season, from 20th January onwards a severe drought was experienced, as the following records show:—

## Gwelo Gaol Records.

Month.	1927-28. Inches.	Average for 1923-24 to 1926-27. Inches.
August ... ..	nil	0.03
September ... ..	nil	0.50
October ... ..	2.19	0.73
November ... ..	2.41	2.04
December ... ..	7.30	7.07
January ... ..	7.71	4.89
February ... ..	0.88	5.93
March ... ..	1.01	2.82
April ... ..	0.31	4.05
May ... ..	nil	0.82
Totals ... ..	21.81	28.88

**Sand Veld Station.**

Month.	1927-28.	Average, 3 seasons.
	Inches.	1925-26 to 1927-28. Inches.
September ... ..	nil	0.51
October ... ..	2.35	0.99
November ... ..	4.32	1.94
December ... ..	4.98	4.58
January ... ..	6.30	4.19
February ... ..	0.48	4.26
March ... ..	0.74	2.93
April ... ..	0.47	0.36
Totals ... ..	19.64	19.76

There is no gauge at the red soil station, which is about a mile from the Gwelo gaol and about the same distance from the sand veld station.

On the sand veld station only 1.69 inches of rain fell from 20th January onwards to the end of the growing season. The results obtained this season admirably illustrate how good farming methods are an insurance against bad seasons, for on those four plots, which are in a definite crop rotation on the red soil area, the average yield was 9.64 bags of maize per acre, whilst the yield per acre on the maize plot, which is not in a rotation, but receives fertiliser every alternate year, was 2.2 bags per acre. The greater humus content and the greater fertility of the soil on the rotation maize plots assisted the crops on these plots to withstand the severe drought after 20th January very much better than the crops on the plot not in a rotation. The highest yield per acre of maize obtained on any plot was 11.3 bags on plot 9, grown in a rotation in which the land receives a fair dressing of kraal manure once in four years, but no fertiliser; during the same period a bean stubble and an oat stubble are ploughed under.

The preparation, planting and cultivation of the two stations were carefully carried out and supervised by Mr. Hopkins, Town Ranger, to whom great credit is due that the stations were kept in such good order.





FIG. 1.



FIG. 2.



FIG. 3.

Red Soil Station, Gwelo.

Fig. 1.—Plot No. 7. In foreground, velvet beans to be reaped (after oats). In background, maize plot No. 6 plus 200 lbs. superphosphate per acre (after velvet beans reaped).

Fig. 2.—Plot No. 9. Maize plus 8 tons kraal manure per acre (after maize).







FIG. 4.



FIG. 5.

#### Sand Veld Area.

Fig. 4.—Plot No. 7b. Ground nuts (after oats plus kraal manure).

Fig. 5.—Plot No. 8a. Maize and velvet beans plus 6 to 7 tons kraal manure per acre.





**RED SOIL STATION.**

Two four-course rotations are demonstrated on this station, in which half the land is under maize each year, a quarter under a leguminous crop and a quarter under ground nuts (Rotation A) and oats (Rotation B).

*Rotation A.*

Each plot is half an acre in area.

Velvet beans and maize planted 29.11.27, ground nuts planted 30.11.27.

Crop.	Yield of grain or seed per acre in bags.				
	1927-28. Rainfall, 19.64 ins.	1926-27. Rainfall, 19.28 ins.	1925-26. Rainfall, 19.53 ins.	1924-25. Rainfall, 47.21 ins.	Average yield per acre, 4 years.
Velvet beans ploughed under...	...	...	...	...	...
Maize with fertiliser, 200 lbs. bone and superphosphate p r acre, after velvet beans ...	9.25	13	21	14.5	14.4
Maize after maize, plus fer- tiliser ... ..	8.0	12	12	13	11.25
Ground nuts, plus 200 lbs. super- phosphate per acre, after maize ... ..	13.2	19	23	Sudan grass, yield not recorded	(3 years) 18.4

The maize was planted 40 inches by 18 inches apart in the row. The standard weight of a bag of maize is 200 lbs. net, and of ground nuts 75 lbs. net.

*Rotation B.*

Each plot is half an acre in area.

Maize planted 29.11.27.

Crop.	Yield per acre in bags.				
	1927-28.	1926-27.	1925-26.	1924-25.	Average yield per acre, 4 years.
Velvet beans reaped	3.2	3.0	not recorded	4.25	(3 years) 3.48
Maize after velvet beans reaped, plus 200lbs. superphosphate per acre ...	9.9	9	10	9.5	9.6
Maize, plus 7 tons kraal manure per acre, after maize	11.3	16	14	19	15
Oats after maize, plus kraal manure	no record	fed green	fed green	fed green	...

The weight of a bag of velvet beans is 200 lbs. net.

*Maize Continuous.*

Half acre plot—planted 29.11.27.

Crop.	Yield per acre in bags.				
	1927-28.	1926-27.	1925-26.	1924-25.	Average yield per acre, 4 years.
Maize continuous, without treatment	4.4	4	6	9	5.8
Maize continuous, with 150 lbs. bone and superphosphate per acre in alternate years ...	fertiliser applied 7.6	6	12	fertiliser applied 12	9.4

If due allowance is made for the drought this season, it will be seen from the above results that the land under the two rotations is being maintained at a high level of fertility, whereas there has been a steady decrease in fertility of the land under maize every year, even where it has received a fair dressing of phosphatic fertiliser twice in the four-year period. It is also evident that the moderate dressing of



fertiliser in the alternate years is profitable, as a yearly expenditure per acre of approximately 5s. 3d. has given an increased yield of more than 3½ bags per acre over a four-year period.

The advantages of working arable land under a system of rotation of crops combined with green manuring and fertilising the land twice in a four-year cycle, such as is used in Rotation A, may be very well illustrated if the gross return from 100 acres worked on this system is compared with that from 100 acres planted to maize each year, basing the figures on the results shown in the above tables.

It should be realised, of course, that land such as this at the Demonstration Station, Gwelo, cannot be cropped continuously with maize, as is done in systems (1) and (2), for an indefinite period, as the yield per acre will steadily decline until a point is soon reached at which it becomes unprofitable to grow maize under these systems owing to the exhaustion of the soil. After a further period of four years the average yield per acre under system (2) will be considerably lower than the figures taken (9.4 bags per acre), and will be nearer to five bags per acre or less. But even when the average yield of 9.4 bags per acre is taken, the advantages of system (3) are very strikingly illustrated in the tables below.

System of cropping.	Total yield of crops in 4 years.	Value of crops, @ 10s. per bag maize and 10s. per bag ground nuts.*	Cost of fertiliser.	Gross return, less cost of fertiliser.
(1) Maize grown continuously without fertiliser ... ..	@ 5.8 bags per acre = 2,320 bags ...	£ 1,160	Nil	£ 1,160
(2) Maize grown continuously, 150 lbs. bone and super-phosphate twice in 4 years ... ..	@ 9.4 bags per acre = 3,760 bags ...	£ 1,880	£ s. d. 131 10 0	£ s. d. 1,748 15 0
(3) Rotation A, fertilised twice in 4 years, and one green manuring...	Maize @ 12.8 bags per acre = 2,560 bags ... Ground nuts @ 18.4 bags per acre ...	£ 1,280 } £ 920 } £ 2,200	£ s. d. 163 10 0	£ 2,037

\* 12s. 6d. is a fair average price for a bag of maize at Gwelo, and a higher price than 10s. per bag is often obtained for ground nuts.

A further point to be considered is that under Rotation A 100 acres of a green manure crop are grown in the four years, which costs only about 14s. per acre to grow, or a total of £70; whereas 100 acres of maize would probably cost approximately £2 10s. to £3 an acre to grow, or a total of £250 to £300 in the four years. Therefore, the farmer working 100 acres of land under Rotation A makes a saving of £180 to £230 (£250 to £300 less £70) on the working costs in the four years, as compared with the farmer working his 100 acres of land under system (1) or (2).

If allowance is made for this, we obtain the following figures for the gross returns under the three systems:—

System 1.	System 2.	System 3 (Rotation A).
£1,160	£1,748 15s.	£2,217 to £2,267
		(£2,037 plus £180 to £230)

In addition to obtaining the above increase in gross return, the farmer working his land under Rotation A has maintained the fertility of his land, that is his capital, and will continue to benefit from this higher fertility by obtaining higher yields per acre of maize and ground nuts.

### *Maize Variety Trial.*

Yields in bags per acre.

Planted 40 by 18 inches apart.

Variety.	1927-28.	1926-27.	1925-26.	1924-25.	Average yield.
Louisiana Hickory ... ..	2.2*	16	12	12	10.5
Potchefstroom Pearl ... ..	5.0	15	10	10	10
Salisbury White ... ..	7.8	N.G.	10	8	8.6
Hickory King ... ..	2.8	N.G.	10	10	7.6
Iowa Silver Mine ... ..	N.G.†	N.G.	N.G.	7	7
American White Flint ... ..	1.6*	7	6	N.G.	4.8
Rhode Island White Cap ... ..	0.8*	5	N.G.	N.G.	2.9
Krug ... ..	N.G.	N.G.	$\frac{1}{2}$	N.G.	$\frac{1}{2}$

\* These varieties in 1927-28 were not sown until three weeks after the other three varieties, and so did not receive the full benefit of the heavy rains in December.

† N.G. = Not grown.

It will be seen from the above table that our standard Rhodesian strains of maize have consistently out-yielded imported varieties of both flint and dent types.

These trials have not yet been carried on sufficiently long to enable a true comparison to be made between the four leading varieties as regards their suitability for this type of soil, but it is not thought likely that the results will vary greatly from those obtained at Salisbury, where there has been no difference in yield in favour of any of the four varieties after an extended trial.

*Ground Nuts. Variety, Spanish Bunch.*

Season.	Treatment.	Yield per acre in bags.	Average yield per acre, 4 years.
1924-25	No fertiliser	14.0	
1925-26	In Rotation A	23.0	
1926-27	In Rotation A	19.0	17.0 bags
1927-28 (1)	In Rotation A	13.2	
	(2) Dressed with 200 lbs. superphosphate per acre after maize (untreated)	16.2	

It has been found in the past, both here and at Bulawayo and Salisbury, that a planting spacing of 24 to 28 inches between rows and 6 to 8 inches between plants in the row gives the best results. The results given above show that ground nuts are a profitable cash crop to grow in a rotation with maize, and a leguminous green-manuring crop ploughed under once in four years.

*Legumes for Grain.*

Yields in lbs. per acre.

Variety.	1927-28.	1926-27.	1925-26.	Average yield.
White stingless velvet beans ... ..	640 } 720 }	680	600	1,080
Osceola beans ... ..	660	...	...	160
Tracey's Early Black beans ... ..	800	...	...	800
Dolichos beans (brown seeded) ... ..	464	...	1,000	732
Cow peas or kaffir beans ... ..	608	600	428	545

The variety, Tracey's Early Black, in the season under review considerably out-yielded the other varieties of velvet beans, and this agrees with results obtained at the Salisbury



station. It does not, however, give such a heavy yield of top growth as the white stingless variety.

*Miscellaneous Crops.*

Date of planting.	Crop.	1927-28. Bags.	1926-27. Bags.	1925-26. Bags.	1924-25. Bags.	Average yield. Bags.	Remarks on 1927-28 crop.
30.11.27	Sunflower (Black Russian)	5.2	14.0	...	5.2	8.1	After maize and after ground nuts and never man- ured.
30.11.27	Kaffir corn	lbs. 340	lbs. 600	...	lbs. 120	360	1926-27. After sunflower, land dressed with 200 lbs. bone and superphosphate.
	Linseed ...	de- stroyed by ants	lbs. 400	...	lbs. 232	316	After kaffir corn, 1926-27
	Boer manna	suc- cumbed to drought	...	...	448	448	After kaffir corn crop.

The standard weight of a bag of sunflower seed is 100 lbs. net.

The Boer manna, Sudan grass and oats all promised well until the drought in February, when they succumbed. The linseed showed good promise, but was finally completely destroyed by white ants.

Kaffir corn was also badly affected by the drought, and the prospect of a good crop was destroyed.

**SAND VELD AREA.**

**Maize Production on the Sand Veld.**

Though the yields of maize from this area, in the season under review, do not equal those obtained in 1926-27, yet, if the severe drought experienced on this station after 20th January be considered, the results obtained with this crop may well be thought satisfactory. Mr. Hopkins in his report states: "This area, in particular, suffered from the drought, and the maize crops, formerly looking well, fell

away, and the exceptionally dry plants presented an unusual sight so early in the season. Reaping could have been carried out at the beginning of March."

Despite the drought, one plot of maize on this area, dressed with 200 lbs. of superphosphate per acre following a crop of dolichos beans ploughed under in 1926-27, yielded at the rate of 7.06 bags per acre, and the average yield per acre for 11 plots was 5.1 bags per acre. All the maize on this area was planted on 26th and 27th November.

*Yields of Maize in bags per acre, 1927-28.*

Treatment.	Yield in bags per acre.
Maize in 4-course rotation under-planted with cow peas and dressed with 200 lbs. bone and super- phosphate per acre ... ..	6.0
Maize in 4-course rotation under-planted with velvet beans and dressed with 6 tons kraal manure per acre ... ..	5.6
Maize in 4-course rotation under-planted with velvet beans, not manured ... ..	3.2
Maize in 4-course rotation, received 8 tons of kraal manure per acre ... ..	6.9

In the season 1926-27, the highest yield of maize on any plot was 15.0 bags per acre, and the average of five plots treated with fertiliser or kraal manure was 12.7 bags per acre (higher than the average of the red soil stations). That season (1926-27) was fairly normal, though the total rainfall was under 20 inches. These figures, considered with those given above for the season under review, demonstrate the severity of the drought experienced from 20th January onwards.

*Yields of Maize planted after Green Manure Crops reaped  
or ploughed under in the previous year.*

	Yield in bags per acre.
After velvet beans reaped ... ..	4.2
After velvet beans ploughed under ... ..	5.4
After dolichos beans reaped ... ..	5.1
After dolichos beans ploughed under ... ..	7.0
After cow peas reaped ... ..	4.6
After cow peas ploughed under ... ..	4.5

The above results, except in the case of maize after cow peas, where the result is negative, are in line with results of similar trials carried out at Salisbury, and demonstrate the greater benefit to a succeeding maize crop of ploughing under the whole green crop, as against ploughing under the stubble alone.

The above results cannot be considered conclusive, of course, as the trial should be carried out over a number of years.

*Ground Nuts on Sand Veld.*

Date of planting.	Treatment.	Yield in bags of 75 lbs. per acre.			
28.11.27.	In 4-course rotation with maize and oats, not manured ... ..	10.8			
28.11.27.	In 4-course rotation with maize and kaffir corn, dressed with 200 lbs. superphosphate per acre ... ..	9.3			
		Season.			
		1927-28.	1926-27.	1925-26.	1924-25.
Average yield per acre of all plots under ground nuts ... ..		10.0	17.3	11.0	10.8

The above results demonstrate the suitability of ground nuts as a crop for sand veld areas, particularly when it is remembered that the soil on which these results have been obtained was a poor sandy soil of low original fertility. The average yield per acre of ground nuts in 1927-28 was 10 bags, compared with 5.3 bags of maize, both crops being grown in a four-course rotation.

It is well to remember that the costs of harvesting ground nuts on sand veld are less than those on the heavier red soils, as the crop can be much more easily lifted from the ground.

Ground nuts form a very suitable crop for growing in rotation with other crops on sand veld, but as a general rule kraal manure should not be applied to this crop direct, but to a preceding crop, as the manure tends to produce top growth at the expense of the yield of nuts. Ground nuts chiefly require phosphatic fertilisers, and respond well to



them. The stems and leaves of the plants form a palatable and nutritious feed for stock, either in the green or dry state, and this should be kept in mind when considering the advisability of growing this crop.

*Teff Grass.*

Planted 7th December, 1927.

Treatment.	Yield in lbs. per acre.
After ground nuts plus fertiliser 1926-27; received	
no manure ... ..	1,530
After ground nuts plus fertiliser 1926-27; received	
6 tons kraal manure per acre ... ..	2,470

The crop was weighed in a semi-dry condition soon after cutting.

Teff grass is a very suitable annual pay crop for sand veld soils, but owing to the rather light yields obtained, it is hardly a profitable crop to grow, except when needed for feeding to well-bred young stock or horses.

# Gouda or Sweet-Milk Cheese-making.

(Revised.)

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By T. HAMILTON, M.A., N.D.A., N.D.D., Dairy Expert.

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*[Gouda cheese-making operations are not usually successful at this season of the year, owing to the poor quality of the milk and the prevalence of gassiness. This type of cheese is best manufactured during March and subsequent months. The article is published now in response to requests for information on the subject.—Ed., R.A.J.]*

Although Cheddar cheese is the most popular cheese made in Rhodesia, yet there is a fair demand for the Gouda or sweet-milk variety, and an article on the methods adopted in its manufacture may be welcomed by dairy farmers throughout the Colony. This variety of cheese is easy to make, the requirements for its manufacture are few and can be found on any well-equipped farm, and it possesses the additional advantage that it can be manufactured from a small quantity of milk with almost as much certainty of success as cheese manufactured on a large scale under factory conditions. It is this cheese which is almost universally manufactured in the farm houses of Holland, and it derives its name from the district in which it was originally made.

**Requirements for Gouda Cheese-making.**—The requirements for Gouda cheese are simple and few in number. These are:—

- (a) A supply of fresh milk obtained under the best possible conditions of cleanliness;
- (b) a cheese mould;
- (c) cheese rennet;
- (d) cheese colour;
- (e) a dairy thermometer;

- (f) a measuring glass;
- (g) an improvised vat;
- (h) a supply of hot water;
- (i) cheap calico for bandages;
- (j) a home-made press, either of the screw or lever type.

(a) **Milk.**—It is essential that milk used for the manufacture of this variety of cheese should be absolutely fresh and obtained under the most sanitary conditions obtainable. As no lactic acid is developed in the milk, any harmful bacteria or any impurity in the milk may, unchecked, cause the finished product to be almost worthless from a commercial standpoint. The working of any gas-producing organism is often not observed until the cheese is put on the shelf to ripen. After some days, if this organism is present, the cheese begins to swell and usually develops a most objectionable flavour and odour. Good quality cheese cannot be made from milk poor in butter fat, and it is recommended that Gouda cheese should not usually be made until the beginning of March. By that time milk begins to be rich in butter fat, the climate is cooler, the grass is beginning to seed, and on this account fewer gas-producing organisms are present.

(b) **Moulds.**—Wooden cheese moulds such as shown in the illustration are generally used. Wooden moulds are used in preference to metal because it is essential that the cheese should cool off slowly after the curd is placed in the mould. If the curd gets a sudden chill, cracks will appear which will not only detract from the appearance of the cheese, but will also allow various bacteria to penetrate, and this will cause severe losses to the cheese-maker.

The mould is shaped so as to cause the finished article to be rounded at the bottom, and when reversed in the mould to “shape” will cause the cheese to acquire (in section) an oval or elliptical form. Gouda moulds are made in varying sizes, ranging from No.  $\frac{1}{2}$  to No. 6. The capacity in pounds of each mould is double of the number by which it is indicated. Thus No.  $\frac{1}{2}$  will contain a one pound cheese, and No. 4 will contain an eight pound cheese. The size of the cheese varies according to the market requirements. Small cheeses of one pound and two pound weight are very popular,



but cheeses of this size have the disadvantage that if kept any length of time they quickly dry out and become hard and dry.

(c) **Cheese Rennet.**—Liquid rennet of standard brands should generally be used, although if cheese is to be made only occasionally, rennet in tabloid form might with advantage be used. Liquid cheese rennet should be kept in a cool dark place and should never be exposed to strong sunlight or kept under conditions of high temperatures.

(d) **Cheese Colour.**—Only standard brands of this substance should be used. On no account should butter colour be used in cheese-making, as the latter substance, being an oily preparation, will not mix with milk, but floats on the top.

(e) **Dairy Thermometer.**—This is essential if cheese-making is to be carried on successfully. Before purchasing a dairy thermometer it is wise to have it tested against a standard thermometer. Cheap dairy thermometers show frequently an error of as much as five degrees, and this may cause the cheese-maker to make a failure of all his cheese-making operations.

(f) **Measuring Glass.**—Whilst a measuring glass is a great convenience if large quantities of cheese are to be made, yet it is not essential when it is remembered that the average-sized teaspoon contains a dram, and that eight drams make one fluid ounce.

(g) **Vat.**—A cheese vat can be improvised from two baths of different sizes, one placed inside the other, leaving a space into which hot water can be poured for the purpose of raising the temperature of the milk.

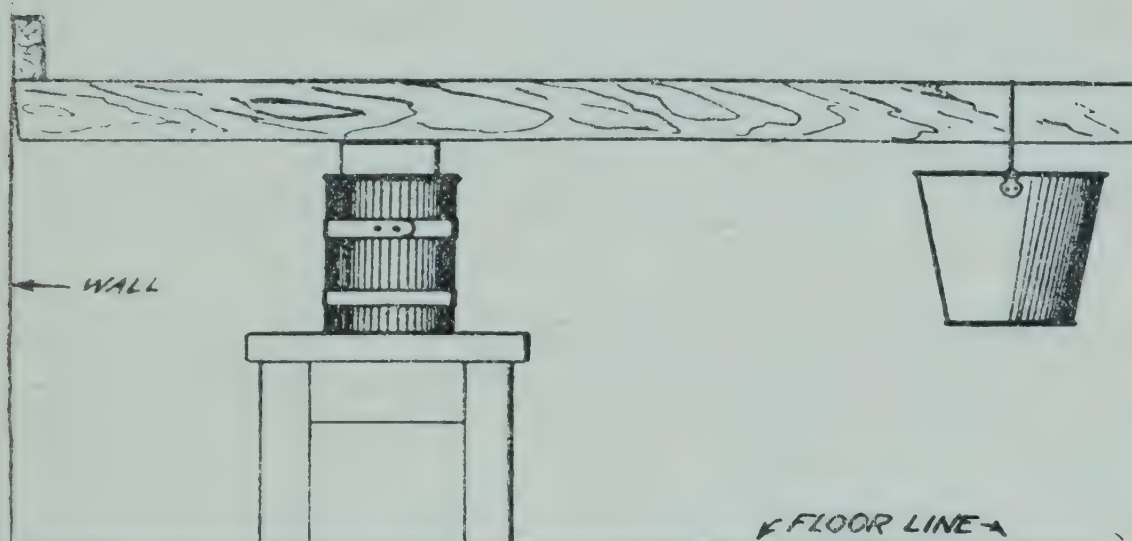
(h) **Hot Water.**—A supply of hot water is always essential in cheese-making, and can be obtained by using a couple of petrol tins as a boiler.

(i) **Bandage.**—This should be made of a cheap variety of calico, well washed before being used.

(j) **Home-made Press.**—A press either of the lever type as illustrated or a simple screw press is preferable to weights directly applied. A screw press has the disadvantage that its

pressure is not continuous, but this to a certain extent can be remedied by giving the screw a turn every two or three hours.

The lever press, consisting of an arm working round a pivot, is simple in construction and has the virtue of putting on continuous pressure. Nevertheless, this type of press has the disadvantage of pressing the cheese out of shape if it is not constantly under observation. If the arm is long enough and the weight carefully adjusted, any required pressure can be applied.



Home-made cheese press. The cheese mould should be placed about 3 feet from the wall. Moving the weight outward on the lever increases the pressure.

**The Process of Cheese-making.**—Fresh milk, obtained under the best possible conditions of cleanliness, is used for Gouda cheese-making. As already explained, it is essential that this milk should be of good quality, testing on an average 4 per cent. butter fat.

The milk should always be strained into the vat (which must be scalded before being used) and cooled down to the renneting temperature (86 degrees Fahr.). Should the weather be excessively hot and natural cooling of the milk slow, cold water should be poured into the “jacket” of the vat and the milk well stirred until the required temperature is reached.

**Adding the Colour.**—When the milk has a temperature of 86 degrees, no time should be lost in adding cheese colour



in the proportion of 1 dram of colour to 10 gallons of milk, *i.e.*, if the colour is up to strength. Sometimes the requisite tinge is not attained by adding this proportion, because the colour varies in strength. In this case more or less colour should be added, as the case may be. Cheese colour should always be mixed with at least ten times its bulk of water before being added to the milk.

**Adding the Rennet.**—After the colour has been well stirred in, standard cheese rennet in the proportion of one dram of rennet to two gallons of milk should be mixed with at least six times its own bulk of clean cold water and well stirred in for two minutes or more, according to the amount of milk contained in the vat. In five minutes' time, after stirring has ceased, the milk should be lightly stirred on the surface with a thermometer to mix down the cream which may in the meantime have risen. The vat is then covered with a clean cloth and left to coagulate.

**Coagulation and Cutting the Curd.**—Under the average circumstances coagulation should be complete in 40 minutes. This should be tested by inserting the finger just under the surface of the coagulum. If the curd breaks cleanly over the finger it is ready for cutting. In large factories the curd is cut with American curd knives, both horizontal and vertical, into small cubes or particles about the size of small berries.

In the absence of these special knives, ordinary table knives tied together as shown in the illustration answer the purpose fairly well, although the period taken in cutting is much longer. During the process of cutting with these knives, stirring should also go on, *i.e.*, if one hand is used for holding the knives, the other should be used for stirring. When cutting is complete, the particles of curd should be uniform in size and the whey which rises should be of a pale greenish colour. If a white whey should result after cutting, a good deal of fat will be lost and the quality of the cheese will be impaired.

**Scalding the Curd.**—After gently stirring with the hand for five minutes, the temperature should be raised gradually by pouring hot water into the "jacket" of the vat. Stirring must be continued throughout the process of scalding. The



rise in temperature must be slow at first, approximately one degree every three to four minutes, until 92 degrees is reached, then more rapidly, until in about forty minutes the maximum scalding temperature, 100 degrees, is reached. Care should be taken to ensure an even scald by keeping every particle of curd constantly moving, and it is essential that the temperature must not recede during the heating process. If this occurs, there is a tendency for the cheese to become dry and tough.

After the maximum scalding temperature has been reached, the curd is stirred for five minutes longer or until, when lifting a portion of the curd from the vat, it has a smooth, silky appearance, and on being pressed together in the hand it should form a ball which will not easily fall apart, but can be torn in half showing the distinct granular appearance. When placed between the teeth the curd should have a rubbery feeling.

**Removing the Whey.**—When the proper stage of firmness has been reached, the curd is allowed to settle for five minutes, and the whey is drawn off either by ladling it out or by means of a syphon. The curd by this time will have become well massed and packed together.

**Moulding the Curd.**—The cheese mould (or moulds) must be previously scrubbed and placed in hot water to prevent an undue chill being given to the curd.

The cheese-curd is removed from the vat by hand and well pressed down into the mould until the latter is filled with well consolidated curd about three-quarters of an inch above the top of the rim. Pressure with the flat hands is continued for two or three minutes and the cheese inverted twice or thrice in the mould in order to shape. The pressure placed on the cheese at this time must not be excessive, gentle pressure with the hands being all that is required. When sufficiently shaped by means of pressure, a piece of clean thin calico (not butter muslin) is placed neatly over the cheese, which in the meantime has been turned out of the mould and is resting on the wooden "follower." The cheese covered with the cloth is quickly put into the mould and neatly adjusted in such a way that when put under pressure none of the curd will be squeezed out.

The cheese is then put under slight pressure, either gained by means of a small lever or a screw press. Some cheese-makers use bricks or stones of known weight as a means of pressure, but these in the writer's experience are unsatisfactory, because of the difficulty of maintaining a steady continuous pressure upon the cheese. The curd is apt to subside at one side and a stable equilibrium is difficult to maintain. The bricks or stones under these circumstances fall off and have constantly to be watched and the pressure renewed.

After being under slight pressure for one hour, the cheese is removed from the mould, is then reversed and a clean bandage is placed on it. It is then again replaced in the press and increased pressure applied for a further two hours. The cloth is again changed and the cheese reversed in the mould, and after being re-bandaged is put back in the press for a further ten hours.

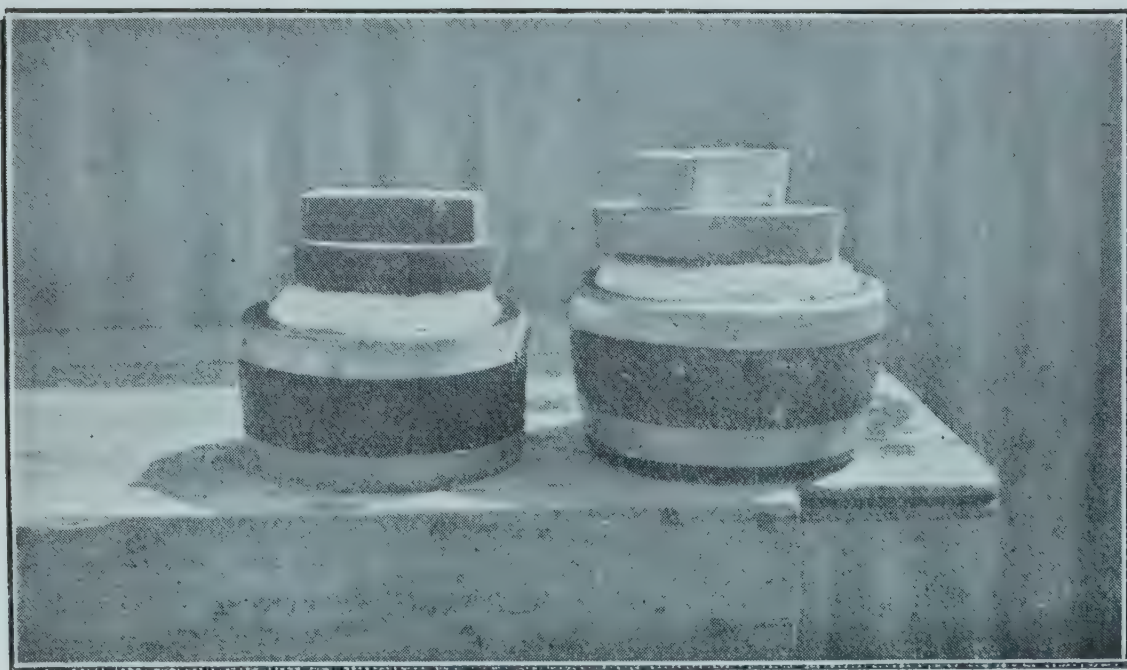
At the end of this period the bandage is wholly removed from the cheese and not replaced, and the cheese is put into the mould with the flat side downwards to shape under a pressure of about one pound per pound of cheese. A little fine salt sprinkled over its surface before pressure is applied will be effective in bringing out surplus moisture and permitting of free drainage.

The shaping process takes as a rule twelve to fifteen hours, during which time the cheese is reversed several times in the mould. During this time the surface of the cheese has been sprinkled with salt, which has the effect of both hardening up the curd and causing excess moisture to be expelled.

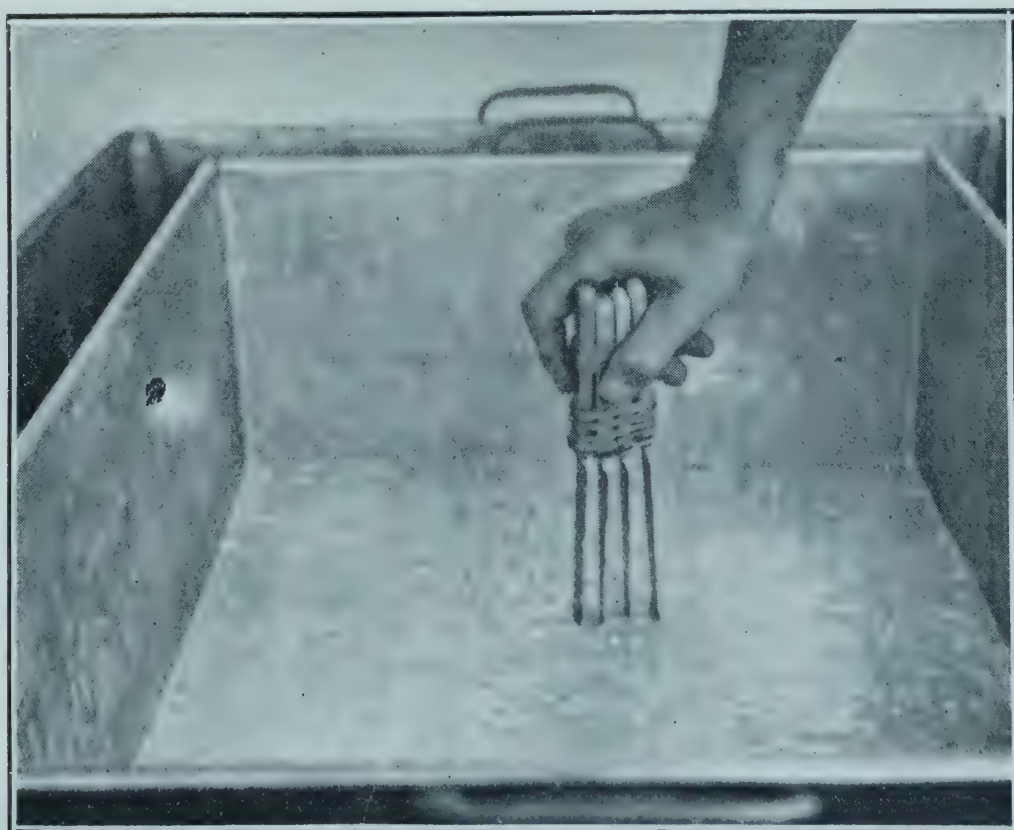
**Salting the Cheese.**—When sufficiently shaped to permit of removal from the moulds, the cheese can either be dry-salted or brine-salted. The former is the better system if only a few cheeses are to be made, but if large numbers are manufactured, the latter system is usually adopted.

In dry salting, the cheeses are periodically well rubbed over with dry salt for a couple of minutes over a period of two and sometimes (in the case of the large-sized cheeses) three days. In brine salting, a brine of sufficient strength to float a potato or new-laid egg is employed, and the cheese allowed to float in the solution for two or three days. A little





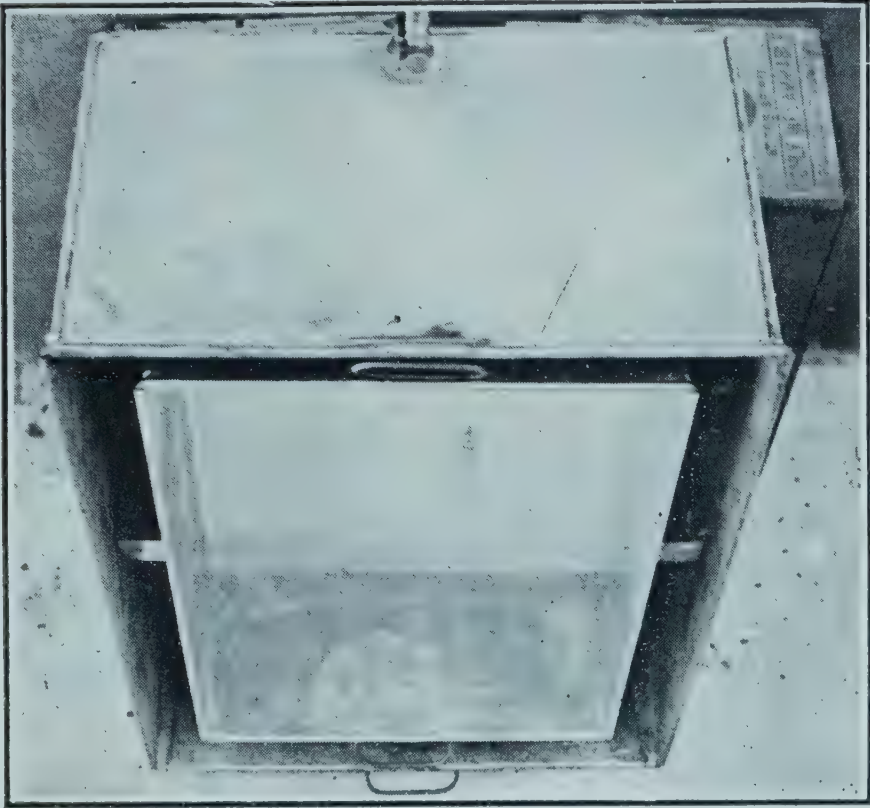
Filling the mould. The curd is pressed with the flat hands until it is  $\frac{3}{4}$  to 1 inch above the rim.



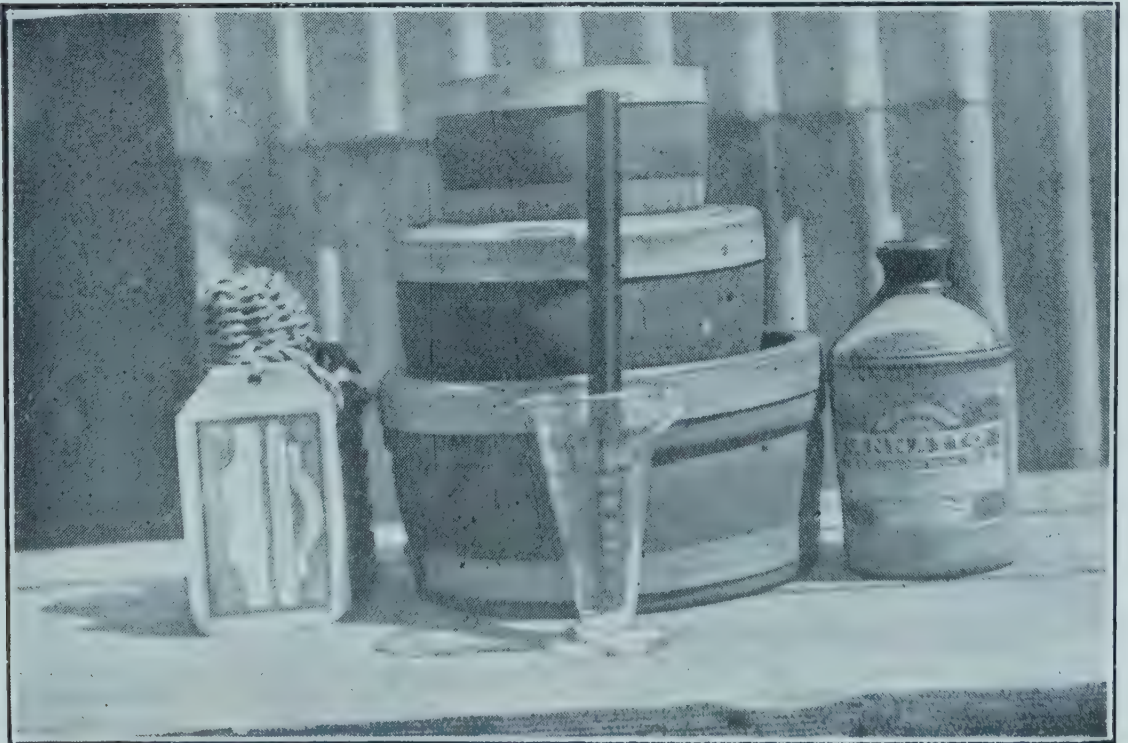
Cutting the curd into  $\frac{1}{2}$  inch cubes with table knives tied together.







The milk in the vat. Any vessel or bath can be used.



Requirements for Gouda cheese-making. Wooden moulds, rennet, cheese colour, thermometer.





salt should be sprinkled over the uppermost surface, and the cheese should be reversed in the solution at least twice a day. In course of time the brine will become foul and the cheeses may develop slimy coats; in this case a new brine solution should be made or the old brine solution may be boiled, and all impurities strained off.

**Curing the Cheese.**—When the salting process is complete, the cheeses should be wiped with a moist clean cloth and then placed on a shelf to mature. During the first twelve days on the shelf they should be wiped with a cloth to remove any surplus moisture which may exude and to assist in the formation of a close rind. This latter desirable feature can best be achieved by bathing the cheese for half a minute in hot water at a temperature of 140 degrees just after the salting process is complete and before putting the cheese on the shelf.

It is best to use a little mild antiseptic solution such as a dilute solution of permanganate of potassium on the cloth used for wiping the cheese on the shelf. This has the effect of checking the development of moulds and harmful bacteria.

When the cheese is about twelve to fourteen days old it can be oiled with boiled linseed oil. This has the effect of closing up the pores and preventing the cheese from drying out excessively.

In certain localities cheese coloured red on the outside is preferred to the natural coloured cheese. This colour, which is a special preparation obtainable at most dairy supply stores, should be painted on before the cheese is oiled. Two thin coats of colour are preferable, and as it dries rapidly, it should not easily come off on the hands when the cheeses are turned.

The temperature of the curing room is most important, and this temperature should be maintained as evenly as possible throughout the curing process. To do this it is essential that a special room should be used which is provided with insulated walls and an insulated ceiling. This latter can be composed of reeds covered with any insulating material, such as charcoal, asbestos, mud or "dagga." The latter has the disadvantage of being heavy, of cracking when dry and of requiring specially strong beams for support.

Whatever insulating material is used, it should prove effective in excluding heat and helping to maintain a constant temperature. Without insulation many cheese store rooms are worse than useless in the hot weather. The temperature runs up to 85 degrees, the cheese "sweats" and loses its butter fat, and is spoilt both in texture and flavour.

Gouda cheese should never be exposed to a draught, as cracks on the surface are often caused by exposure to a cold wind. These cracks are apt to spread and to admit moulds, and in course of time the cheese may be ruined. The windows of the curing room should therefore be so constructed in relation to the shelving that such draughts and their consequent losses are avoided.

The cheese shelves should be kept perfectly clean and preferably fixed in such a way that they can be easily removed outside for cleansing purposes. Dirty shelves harbour mites and other undesirable pests, and with plenty of hot water and soda and a final sluicing with hot water in which a little formalin has been placed, no danger of infection need be feared.

**Gassiness in Gouda Cheese.**—Gassiness in milk and gassy cheese appear to be more prevalent in Rhodesia during early spring than at any other time of the year.

As is recommended elsewhere in this article, however, Gouda cheese should not usually be made until the beginning of March, as by that time it is usually possible to produce milk comparatively free from gas-producing organisms.

Nevertheless, many cheese-makers attempt to manufacture this type of cheese during the early spring months, with the result that considerable difficulty is usually experienced in overcoming the various abnormal fermentations which occur in milk and cheese at that season of the year.

The treatment of gassy curds in cheese-making is discussed in detail in the article which appeared in this Journal in December, 1924, and it will be sufficient here to mention briefly the methods commonly employed in handling milk which has been infected with gas-producing organisms:—

*The Use of Commercial Starter.*—The development of gas-producing organisms may frequently be checked and their activities controlled by means of a commercial starter.



The latter is a culture of acid-producing bacteria, and is obtainable locally in powdered form, in small bottles. Full directions as to the preparation and use of the starter are issued with every bottle.

The quantity of starter to use varies according to whether the milk is seriously or only slightly infected with gassy organisms. As a rule one pint of active starter should be used with every ten gallons of milk, but when the latter is decidedly gassy, a larger quantity of starter—two to three pints for every ten gallons of milk—is necessary if satisfactory results are to be obtained.

The milk is usually ripened for a short period, and it is advisable also to raise the scalding temperature a few degrees.

*The Saltpetre Treatment.*—In some cases the addition of starter to the milk appears to have very little effect in checking the development of the gas-producing organisms, and in spite of every precaution that the cheese-maker may take, the formation of gas persists.

In these cases the use of saltpetre is advised, and may be effective in producing a firm, non-gassy curd. Saltpetre may be applied after the curd has been cut. At this stage the curd is allowed to settle for a few minutes, and a small quantity of whey is ladled out; in this the saltpetre is dissolved and the solution poured back into the vat. Stirring is then continued and cheese-making is carried on in the usual manner. Saltpetre is frequently added to the milk when fresh, a practice which, while checking the formation of gas, has to some extent a similar effect on the production of acid.

At whatever stage the saltpetre is added, it is essential that the milk be inoculated with an active commercial starter. The amount of saltpetre used should not exceed one ounce for every twenty gallons of milk; when used in excessive quantities, this substance tends to produce a hard, dry, flavourless cheese. Finally, it should be borne in mind that the use of saltpetre is recommended only in extreme cases when excessive gas is prevalent and when an active commercial starter has been employed to cause a rapid development of acidity.



**SUMMARY.**

- (1) For Gouda cheese only the best possible milk must be used. It must be obtained under conditions of strict cleanliness.
- (2) When the milk is cooled to 86 degrees, cheese colour in the proportion of one dram to ten gallons of milk should be added. The colour must be first mixed with ten times its volume of water.
- (3) Cheese rennet in the proportion of one dram to each two gallons of milk should then be added. The rennet must be diluted with water.
- (4) The rennet having been well stirred into the milk, coagulation is usually complete in thirty-five to forty minutes.
- (5) When it breaks cleanly over the finger, the curd is cut with knives tied together. Cutting should continue until the pieces of curd are the size of small berries.
- (6) Stirring should continue five minutes after cutting is complete, and the temperature should be raised slowly one degree every five minutes at first, then more rapidly, until at the end of forty minutes a maximum temperature varying from 97 to 100 degrees is reached. Stirring should continue about five minutes longer.
- (7) When the curd is firm enough to stick together when pressed in the clenched hand, and does not crumble into pieces, stirring should be stopped and the curd allowed to settle.
- (8) The whey is then removed and the curd placed in the cheese moulds, which have been already heated in warm water or whey. The curd is filled into the mould until it is about three-quarters of an inch above the rim, after being well pressed in with the flat hands. It is then reversed and put back into the mould. The cheese is wrapped in a square piece of thin calico and placed as neatly as possible back into the mould. The cheese is then placed under slight pressure for one hour.
- (9) After one hour's pressure the cheese is removed and re-bandaged in a clean bandage and returned to press, heavier pressure being now applied.

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- (10) After two hours have elapsed, the cheese should again be taken from the mould, reversed, and a fresh bandage put on. As this will be the final bandaging, care should be taken to adjust the bandage neatly. Any double folds will press into the cheese and cause unsightly marks. Heavier pressure, about 20 lbs. per pound of cheese, is now applied, and the cheese left in the press for eight to ten hours longer.
  - (11) When fully pressed, the cheese should be removed, the bandage taken off and the cheese put into the mould to shape, flat side downwards. A little salt should be sprinkled over the surface of the cheese. The "follower," with a two pound weight on top, should be placed on the cheese and the cheese left to shape. During the pressing, particles of curd may protrude at the sides of the cheese; these can be pared off neatly before the cheese is allowed to shape.
  - (12) When sufficiently shaped to permit removal from the moulds, the cheese is either brine-salted or dry-salted for two to three days, according to the size of the cheese.
  - (13) When salting is complete, the cheese should be put on a shelf, wiped every day with a clean cloth wrung out in clean water, and turned.
  - (14) After about twelve days the cheese is rubbed perfectly dry, and if preferred is coloured with special red cheese colour.
  - (15) The cheese should be ready for consumption in from five to six weeks, but if very small cheeses are made, which, because of their small size, are apt to dry out excessively, they should not be kept longer than a month. Large cheeses can, however, be kept with advantage eight weeks.

## Preliminary Experiments on the Control of White Mould of Tobacco.

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By J. C. F. HOPKINS, B.Sc. (Lond.), A.I.C.T.A.,  
Chief Botanist and Mycologist.

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White mould, which is due to a fungus (*Erysiphe cichoracearum*), may be considered to be the most destructive disease of tobacco in Rhodesia. In certain districts, particularly the Umvukwes and Marandellas, where the altitude exceeds 5,000 ft., the loss due to this disease may be as much as half of any particular crop. The mould appears universally on tobacco throughout the Colony, and it is most desirable that practical field control measures should be devised.

Up to the present a certain amount of success has been achieved by priming off the large lower leaves before the fungus makes its appearance in its typical form as a coating of white spores on the surface of the leaf. If a careful watch is kept on the tobacco crop it will be noticed, a few days before white mould becomes evident, that the large lower leaves of the plants appear to be ripening, but instead of becoming a healthy yellow they acquire an "anæmic" whitish-yellow colour. It has been found that this unhealthy appearance is due to the action of the fungus, which has already established itself and is growing in the leaf tissues. The immediate removal of the large lower leaves at this stage will reduce to a considerable extent the losses due to the fungus. If these leaves are examined microscopically, few or no spores will be observed, but, if left for a day or two, a thick coating of spores will be produced in the ordinary way. It is thus of not uncommon occurrence to find leaves which are apparently healthy and free from disease developing large black patches after being in the barns for a short time, due to rapid growth of the white mould fungus under favourable conditions of temperature and humidity.



Many observations have been made in this Colony on the incidence of white mould, but its origin and behaviour still remain obscure. For instance, it usually appears at a certain time of the year, about the first week in February. The natural conclusion to be drawn is that the tobacco crop needs to have reached a certain stage of maturity before it becomes susceptible to the disease. But then plants at any stage of growth, if growing in unnatural surroundings, such as pots and glasshouses, or are isolated, will become infected. Again, it has been shown that severe priming gives a large amount of control in the field, due, presumably, to thorough aeration, yet isolated plants in patches where the stand is poor are usually the most heavily diseased. It is general experience that hot, dry weather is favourable for the development and spread of white mould, yet it is usually most severe in districts where cold, damp nights are commonly experienced, and, as a rule, first appears after a spell of such weather.

Unfortunately no time has been available for studying closely the conditions contributing to the disease, but it would appear that our Hickory Pryor tobacco is a very susceptible variety (although satisfactory in other respects), and is easily infected if not growing under optimum conditions — such as when approaching maturity. In considering the incidence of white mould in the field it must be borne in mind that there are two phases intimately concerned in the life history of the fungus. The first is infection and purely vegetative or mycelial growth of the organism, and the second is spore formation. As already stated, the fungus may establish itself and grow in the leaf tissues for some time before spores are formed, in which case infection is limited to the originally diseased plants. When, however, spores are produced the fungus makes its appearance in its well-known form, and is spread from plant to plant, and, presumably, from field to field, as the spores are disseminated by the wind, in the same way that the seeds of a dandelion are dispersed. Observations show that spore formation is more rapid during dry weather, and it is possible that this also applies to vegetative growth; but information on the latter point is not complete. A cold, damp environment is also favourable for growth of the fungus, so that it quickly infects the whole of a leaf under

these conditions. A sudden rise in temperature, with a corresponding drop in the relative humidity of the atmosphere, seems to induce a rapid production of spores, which in many, if not all, cases results in a heavy infection by white mould.

A periodicity in spore formation seems to play an important part in the amount and time of incidence of the disease in this Colony, and is illustrated in the accompanying graph (Fig. 1), which has been compiled from counts made in control plots of experiments to be described later. The numbers of infected plants were counted at the dates indicated on the horizontal axis, and the average total increase was plotted from the vertical axis as shown. It will be seen that there was an increase in the number of infected plants until a point was reached where the number of healthy plants remaining had decreased to such an extent that the amount of further infection was necessarily curtailed. When, however, these infection counts were expressed as a percentage of the number of healthy plants at the previous count and plotted as before, a distinct periodicity was noticeable. This, presumably, results from the cycles of spore formation and vegetative growth already referred to.

On the 8th, 9th, 10th and 12th February a total of 2.17 in. of rain fell. From 12th February until 4th March there was no further precipitation. On 4th, 5th and 6th March a total of 0.34 in. was recorded, and on 11th March a fall of 0.08 in. occurred. It will be seen that for most of the period during which records were kept no rain fell, and that conditions were very dry, so that fluctuations in climatic conditions would not account for the periodicity of infection shown in the graph. It is notable that the fall of 0.34 in. of rain in March had the effect of reducing the amount of infection on the following days, and it is surprising that such a small precipitation should have this effect. It has been observed previously in this Colony that rainfall reduces subsequent infection by white mould, and this is thought to result from a lesser production of spores.

Although good control of white mould has been obtained in a number of instances by suitable priming, yet this method has many disadvantages, and is at the best uncertain. Similarly, wide spacing does not guarantee

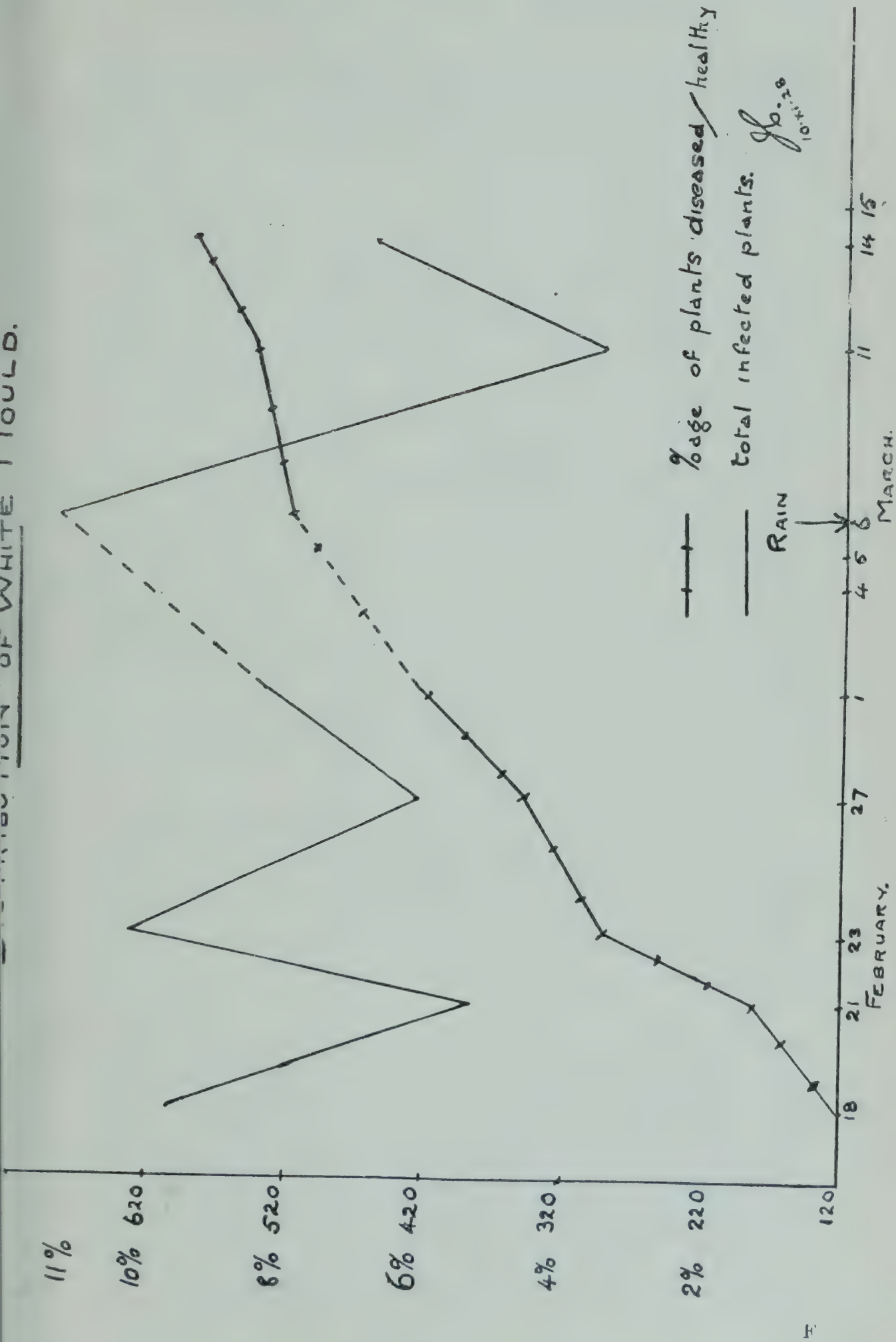


Fig. 1.—Curves showing incidence of white mould in control plots.  
 Note.—No counts were made between 1st March and 6th March.



immunity, but certainly ensures a reduced yield. It was, therefore, decided to repeat the experiments of D'Angremond (1) in Java, with sulphur, since the less humid climate of Rhodesia offered better chances of using this fungicide economically.

**Sulphur Experiments.**—These experiments were planned to ascertain whether control of white mould could be obtained with economically practicable applications of sulphur to the soil. It was considered that 40 lbs. per acre would be the maximum possible from the financial point of view, and the minimum amount which would give sufficient check to the disease. Applied at this rate, the treatment would cost approximately 14s. per acre.

Hickory Pryor tobacco was used, as representing the Rhodesian type.

Two half-acre plots were each divided into quarters, giving eight plots of one-eighth acre.

Ordinary vine sulphur was used, and was applied to the soil in handfuls between the rows. Great care was taken to prevent sulphur dust being blown on to the leaves, and for this reason no mechanical duster was employed.\* Experiments with very finely-divided sublimed sulphur showed it to be unsuitable for tobacco, owing to its being easily blown about the field and contaminating the plants.

Two plots were each treated once at the rate of 40 lbs. per acre, two received 80 lbs. per acre each in two applications, and two were treated three times, receiving in all 120 lbs. per acre each. Two control plots were used. The plots were so arranged that those receiving the lesser amounts of sulphur were to windward of the remainder.

D'Angremond found that approximately 135 lbs. of sulphur per acre were required to give complete control, but under Rhodesian conditions not a single infected plant appeared in plots receiving much smaller dressings. White mould was, however, observed in both control plots on 17th February. Counts were commenced on the 18th, and continued until 14th March, when reaping began. The numbers of infected plants in the two plots at the conclusion of the

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\* *Warning.*—Tobacco leaf is unsaleable if contaminated by sulphur.

experiment were 246 and 342, representing percentages of 39.4 and 54.7 respectively. For some unexplained reason the latter control plot showed 121 infected plants in the first count as compared with 38 in the former, but from then onwards the increase at each count was similar for each plot, and the final count found the numbers in nearly the same proportion as the first.

It was unfortunately not possible to reap, cure and grade separately the crops from individual plots, but it is hoped that this may be done when further experiments are conducted this year.

Sulphur was applied on the following dates: 31st January, 10th February, 25th February, and, despite the fact that the usual cultural operations of cultivating, priming, topping and suckering were carried out when necessary, a distinct odour of sulphur was still evident in all treated plots at the conclusion of the experiment, some six weeks after the first application.

A chemical analysis of leaves collected from plots receiving 40 lbs. per acre of vine sulphur in one application showed the percentage of sulphur (expressed as S) to be 0.185, as compared with 0.183 in the controls, a difference within the limits of experimental error.

**Conclusions.**—Under the climatic conditions prevailing during last season it has been shown that vine sulphur, applied at the rate of 40 lbs. per acre in one dressing, gave complete control of white mould on Hickory Pryor tobacco. A chemical analysis of leaves from treated plots showed that no deleterious effect resulted from the presence of sulphur on the soil.

It is obvious, however, that far more extensive experiments are required to be conducted before recommendations can be made regarding the general use of sulphur as a fungicide, and it should be distinctly understood that the writer, in giving an account of experiments carried out, is in no way recommending the methods described as a control for white mould, but it is hoped that the experiments which are planned for the coming season will afford definite information which will be available for tobacco growers.

## SUMMARY.

1. White mould (*Erysiphe cichoracearum*) is probably the most destructive disease of tobacco in Rhodesia.
2. The fungus may establish itself and grow for some time in the leaf before producing the typical powdery coating of white spores.
3. Infected leaves are not uncommonly put into barns, where they develop black, rotten areas, due to the rapid growth of the fungus in the tissues.
4. It is believed that a periodicity of infection is caused by cycles in vegetative growth and spore formation of the fungus; and that certain climatic conditions influence these periods of growth.
5. Vine sulphur applied to the soil gave complete control of the disease under given conditions.
6. Leaves from treated plots showed no deleterious effects from the presence of sulphur on the soil.
7. Recommendations for the general use of sulphur as a fungicide are not made.

## REFERENCE.

1. D'Angremond, A.—Jaarverslag van het Proefstation voor Vorstenlandsche Tabak. 1 Mei-30 April, 1925. *Proefstat. Vorstenlandsche Tabak. Meded.* 55, pp. 31-58, 1926.



## Tobacco Growing in Southern Rhodesia.

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Notes from an Address by D. D. BROWN, Chief  
Tobacco Expert, to the Darwendale-Trelawney  
Farmers' Association.

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Before discussing any remedial measures it is necessary to review briefly a few of the factors influencing the setback suffered by the tobacco industry in Southern Rhodesia.

One factor is the very extensive and rapid increase in production, and there is no doubt that a great deal of our trouble is due to production outstripping marketing facilities. The type of tobacco produced has also an influence on the state of the industry in this Colony.

Until the production exceeded the local demand it was possible for tobacco growers to dispose of their crops, with the exception only of the lowest grade tobacco. The main object of the majority of tobacco growers was the production of a very bright tobacco, the size and body of leaf being considered of secondary importance to the colour.

The old order of things has now passed, and early attention will need to be given to present requirements if we hope to make the desired progress. The tobacco shipped to overseas markets must be of good body and fair size. Southern Rhodesia is now in active competition with other tobacco producing countries, and, as time goes on, this competition will become more intense. The question of quality will therefore be one of increasing importance.

The necessity for keeping down the cost of production to the absolute minimum cannot be over-estimated. Proper supervision of native labourers and the use of suitable machinery and plant will be of material assistance in achieving a reduction in working costs. Yield per acre is also a

great factor in effecting a lower cost of production, besides having some influence on the quality of the crop. It is generally found that a good yielding crop is also of good quality.

Unnecessary waste in the field, barns and grading sheds increases the cost of production in a relative degree to the quantity of tobacco wasted. The principal causes of wastage are due to bad field work, therefore the elimination of waste must be attended to in the field.

Having drawn attention to a few facts relating to tobacco culture, it is advisable to suggest certain measures whereby an improvement in the general standard of the tobacco crop may be attained. No new or revolutionary methods are suggested, but recommendations which have been previously urged upon growers, with unfortunately, in many instances, very little heed being taken by those who would have derived most benefit from the advice tendered. This statement is not made in any spirit of criticism, but to draw attention to the laxity with which some growers view their farming operations.

The seed beds are the foundation of the tobacco crop; unless proper care is exercised and every effort made to produce good, healthy seedlings, it is not reasonable to expect a good crop in the field. The preparation and maintenance of the seed beds is unfortunately very often considered to be but a minor detail in tobacco culture. Time does not permit detailed reference to the care and management of tobacco seed beds, full information being available in articles which have appeared in the *Rhodesia Agricultural Journal*, and reprinted in bulletin form. However, all growers would be well advised to give personal supervision and attention to the tobacco seed beds.

Field operations are next to be considered, and, as previously indicated, it is here that each individual grower has an opportunity of doing his share towards improving the standard of Southern Rhodesian tobacco. The soil should first be properly prepared for the crop. New land is best ploughed up during the season previous to planting; the best time is when the grass and other vegetation still contain a certain amount of moisture, and before the soil dries out after the end of the rainy season. After being broken up,



the land is left over the winter season and ploughed up again during the following spring. Land which has already produced a crop should be ploughed soon after the reaping of the crop and left until the following spring. Irrespective of being either virgin land or land previously under cultivation, it is important that a good tilth be obtained before the tobacco crop is planted; soil cannot be brought to the required tilth after the crop is transplanted in the field.

The soil is often badly prepared because of extensive acreages and a late start made in ploughing operations. It is much sounder farming practice to prepare a smaller acreage thoroughly than to endeavour to scrape over an acreage larger than is fully justified by existing facilities on the farm. Very often a certain area is properly prepared, and an additional acreage is quickly scratched over to serve as some sort of make weight. This policy is to be deprecated, for it must be realised that, under these circumstances, the average yield value of the whole crop suffers depreciation through the inferior quality and lower yield which are generally produced on land that is not properly prepared.

The foregoing applies to the application of fertilisers. Where only a certain quantity of fertiliser is available it is better to apply a full dressing to a given area, rather than a light application to a larger acreage. *Under-fertilising* is false economy. The present method of application by hand is wasteful of labour, and the quantity applied to each plant sometimes varies to a considerable degree unless very close supervision is exercised over the natives doing the work.

At times it has been noted that instead of applying the measured quantity of fertiliser natives will dump down excessive amounts in order to have the fertiliser bags emptied and their day's contract finished before going to the compound.

Another reason for irregularity in applications of fertiliser is the desire to have no fertiliser left over when the end of the row is reached, as, otherwise, more walking would be entailed in refilling the small bags or tins usually carried by the natives whilst doing this work. The use of machinery for applying fertiliser in drills and broadcasting saves labour and eliminates to a great degree the personal factor.



The next item is transplanting the tobacco. The crop should be transplanted as early in the season as possible. Late planted tobacco does not mature properly in the field, curing is more difficult, and the quality of the leaf is inferior. Generally speaking, it may be stated that our best flue-cured leaf is harvested from tobacco planted out during November-December. It is seldom that flue-cured tobacco planted as late as the end of January and during February cures out satisfactorily.

When the plants are about 12 inches high the lower leaves should be removed and earth drawn up round the stem. No definite statement can be made regarding the number of times the fields should be cultivated. It is an established fact that proper cultivation has a decided influence on the quality of the leaf. The early cultivation should be fairly deep, and, as the root system of the plant develops, cultivation should be proportionately made shallower, otherwise damage to the young rootlets will result. The object of cultivations is not only to free the crop from weeds, but also for soil aeration.

We now come to those very important operations in tobacco culture, "priming," "topping" and "suckering." The large percentage of "shorts" contained in bales of Southern Rhodesian tobacco has been commented on by tobacco buyers in England. The presence of a large quantity of small leaf in the tobacco exported from this Colony is bound to be detrimental to the progress of the industry. By proper field management, however, it is possible for growers to reduce the percentage of "shorts" to a minimum, namely, by priming and topping the plants correctly. For bright flue-cured tobacco the lower leaves of each plant should be removed and the stalk cleaned up to 12-18 inches above the ground. The removal of these small leaves will not entail any loss in yield, but, on the contrary, the yield will very likely be heavier. Suitable priming is also a control measure against certain diseases, the most prevalent being "white mould" or "mildew."

When topping the tobacco, each individual plant must be treated as a separate unit; for instance, a vigorous plant should be allowed to carry more leaves than a weaker plant. High topping, a very common fault in this Colony,

is not only conducive to the production of a very high proportion of "shorts," but is also responsible for the disproportionate amount of scrap and trashy leaf found in the majority of our tobacco crops. Here again there is an increase in yield when the crop is properly topped. The plant food is available for the full development of leaf which is saleable instead of being wasted in the small, worthless leaves left at the top of a plant when carrying too many leaves.

When topped too high the plant is unable to develop all its leaves; consequently, very few leaves can mature properly, the top leaves robbing the lower ones of plant food. Therefore, the yield is low and quality is lacking. In many instances the top leaves are too small to harvest, or, if reaped, are of no commercial value. A correctly-topped plant will fully develop all the leaves, which, when cured, are of commercial value, the yield being higher and quality better.

It is, of course, possible to top plants too low, but from general observations over a period of years, it has been noted that growers are inclined to top too high rather than too low. Actual experience is required by the grower, and he must use his own judgment in this operation, but as a guide it may be stated that twelve to fourteen leaves per plant is considered sufficient for our local conditions.

Another factor influencing the yield and quality of the tobacco crop is the suckering. All suckers should be removed from the plant at frequent intervals, preferably as soon as they appear between the leaf and the stem. Neglect to keep the crop free from suckers is one cause of low yield and thin, papery leaf.

When the tobacco is ready for harvesting, great care should be exercised in picking only ripe leaf of uniform quality. The leaf should be carefully handled and not bruised or damaged in any way. Green tobacco is not wanted and should not be offered for sale. Ample barn accommodation should be provided for the handling of the crop.

To plant an acreage far in excess of the available barn space is an unnecessary waste of capital and time. The reason generally advanced for this practice is that only the best tobacco will be harvested, but, human nature being what it is, we find every effort being made to harvest the whole

crop. The result is the barns are overcrowded, the curing process is rushed, the tobacco is carelessly handled, and the final result is a depreciation in the average standard over the whole crop.

The cured tobacco should be properly bulked and attended to until it is ready for grading and baling. Tobacco growers would find it advisable to use a special waterproof paper when baling their crop. This paper is wrapped round the bale between the tobacco and the usual hessian covering. When baled in this fashion the tobacco does not dry out so rapidly, and the quantity of scrap caused through breakage is reduced to an absolute minimum. The cost of the paper packing runs out at about 6d. per bale, a cost which is more than repaid by the saving in scrap and the improved condition of the tobacco in the bale.

In conclusion, it may be stated that "tobacco culture" is a highly scientific branch of farming, and, as such, requires constant study and application on the part of the producer. There is no "royal road" to success—just hard work and common sense. The aim of every tobacco grower should be to produce *quality, and not quantity*. Every endeavour should be made to increase the acre yield and to reduce the cost of production.

There are many details in connection with the production of tobacco which of necessity have not been mentioned in this address. Full information on all phases of "tobacco culture" is available in bulletin form or in the *Rhodesia Agricultural Journal*, obtainable from the Editor, *Rhodesia Agricultural Journal*, Department of Agriculture, Salisbury.



# Tobacco Barn Heating at Chipoli,

## AND A METHOD OF COMPARING THE EFFICIENCY OF DIFFERENT HEATING SYSTEMS.

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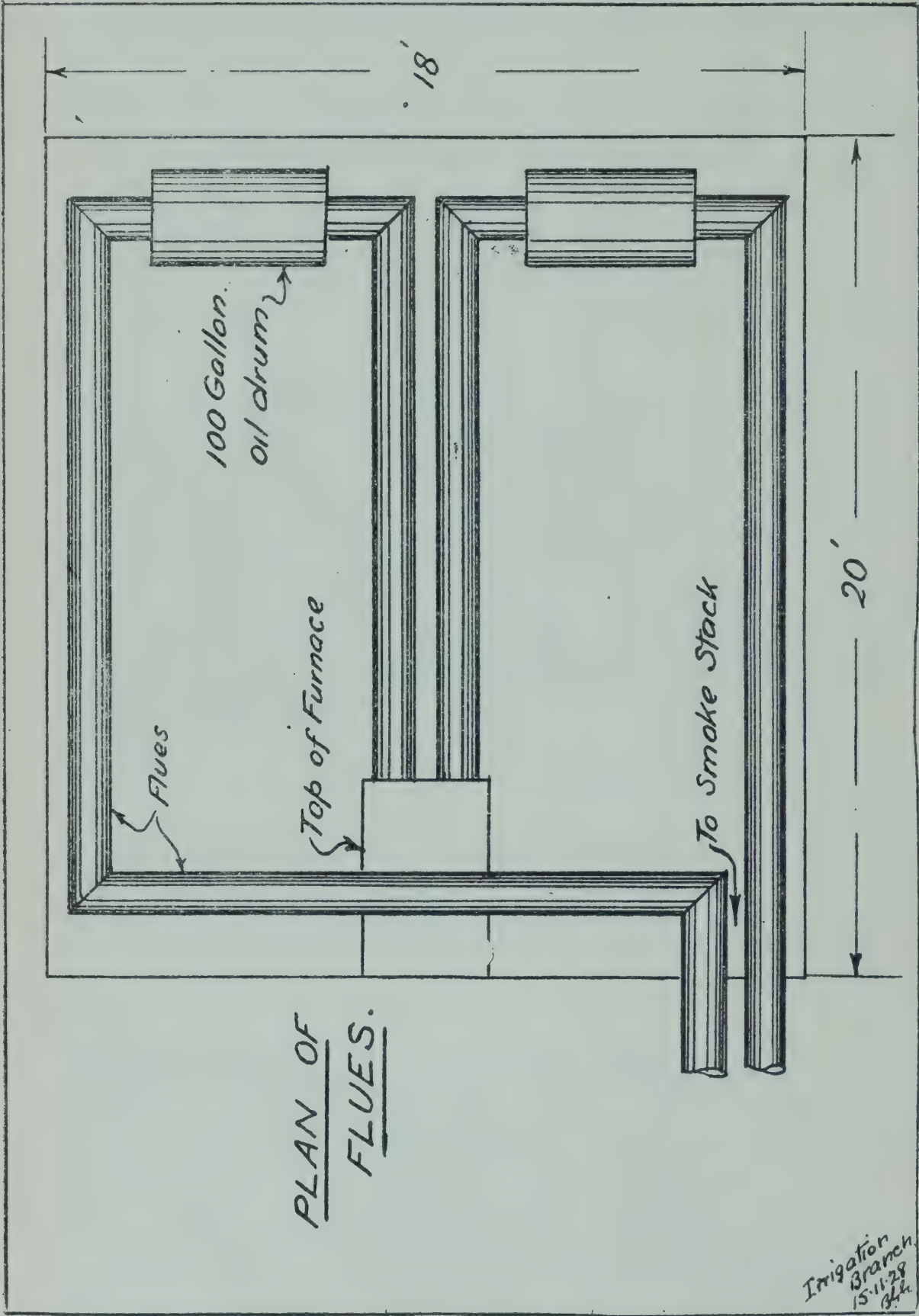
By J. M. MOUBRAY, M.I.M.M.

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*(We have submitted the following article to the Irrigation Engineer, who comments as follows: "The article should be of interest to all tobacco growers who are desirous of effecting a saving of fuel used in curing operations. The scheme appears sound, and embodies the correct heating principles, but a definite recommendation that this type of furnace and heating installation be adopted cannot yet be given, as no tests have been made by this Department. The test described for the comparison of heating values of different furnaces is useful, and could be advantageously adopted by farmers to compare the relative merits of various heating systems. I would, however, advise more than one test in respect of each furnace.")*

*We might add that the matter of the thermal efficiency of heating systems has been receiving the attention of the Department of Agriculture, and that an article on the subject appeared in the issue of this Journal for last April.—ED., R.A.J.)*

The chief fault that strikes one who has any knowledge of heating methods in the system in use generally throughout the Colony in tobacco barns is the high temperature at which the flue gases escape into the atmosphere. This means waste of fuel. In order to reduce this waste without installing the somewhat expensive ready-made interior furnaces, the arrangement of furnace and flues as shown in the accompanying sketch was evolved. The result has been a saving of about half the fuel, as against that used with the old-fashioned exterior furnace and uniform section flues.



Tobacco barn heating at Chipoli.

The first saving takes place in the furnace, being an interior instead of an exterior one. With the latter a considerable body of masonry has to be heated up to no purpose. Again, the crown of the Chipoli furnace, being boiler plate, provides extra radiating surface as against a brick arch. This radiating surface is utilised to heat the ventilating air before it impinges on the leaf.

The fire-bars are made out of two old railway sleepers punched with frequent holes. The cost of the entire furnace, provided one can buy the boiler plate second hand, should not exceed £2 10s.

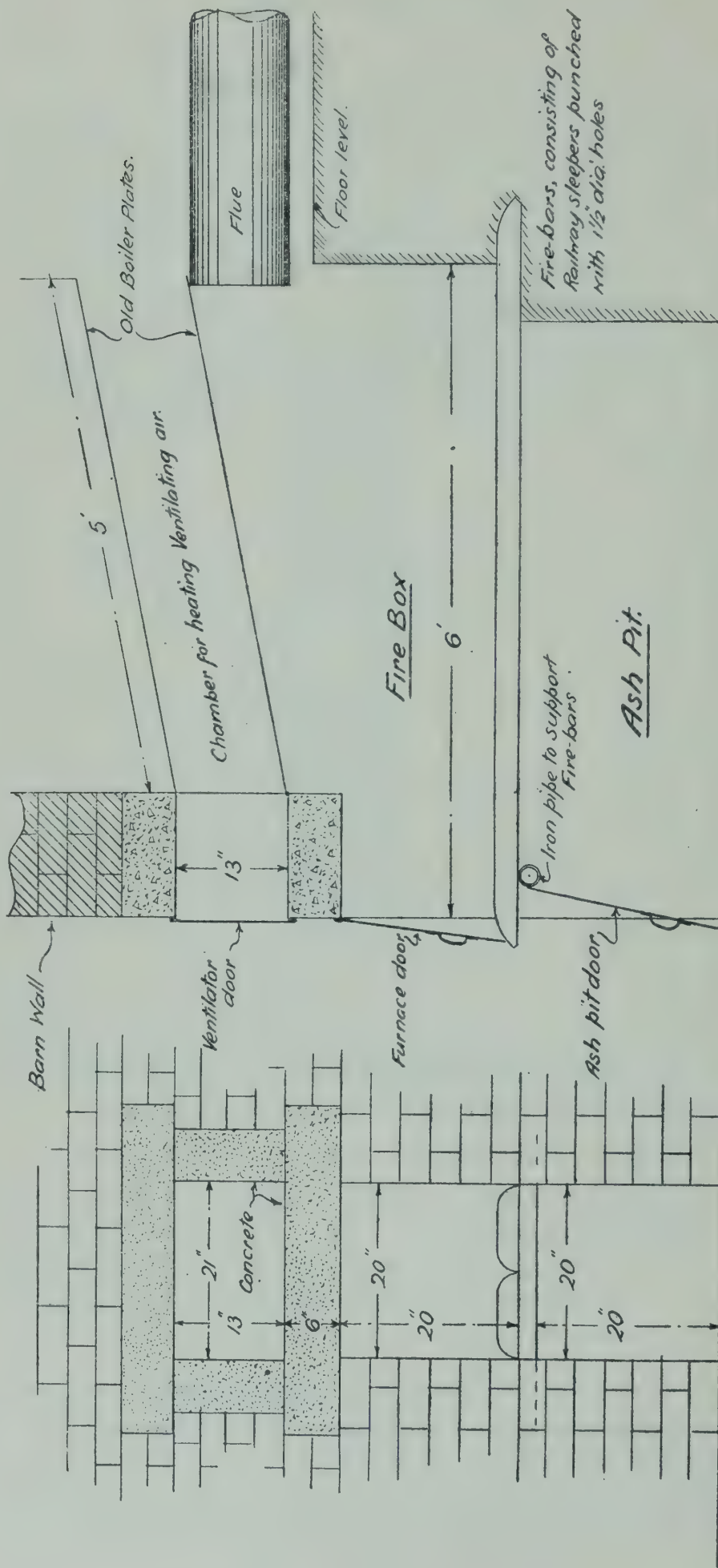
The arrangement of flues is not costly. The 100-gallon steel drums can be purchased locally. Two or four can be used for each barn, and it follows that with four one would get more heat out of the fuel than with only two.

The ventilating air can be distributed better if required by the temporary use of some lengths of stove piping inserted into the ventilator top and terminating in different parts of the barn. They can be slung up on pieces of wire after the barn has been filled, and removed again in a couple of minutes before the barn is to be emptied. It is suggested that for the sake of comparison, and to bring home to growers the poor radiating powers of the present flues in use, that the following method of testing them be tried. The experiment is very simple and should be of great interest to tobacco growers who are out to improve their methods of firing, especially in view of the coming shortage of firewood. One even now hears of tobacco farms on which no firewood is left.

Thus 20 lbs. of dry grass is used; this may be taken as a standard fuel for testing, as being a material which is fairly constant throughout the Colony. The grass used for the test, results of which are given below, was taken from a haystack, and was ordinary grass from three to four feet long, such as most farmers make into hay.

Great care must be taken to obtain as nearly as possible the mean temperature of the barn, and for this purpose five thermometers are used in different parts of the barn, and the readings taken till the temperature begins to fall. The grass is fed into the firebox gradually, so as to give the maxi-





FRONT ELEVATION.

LONGITUDINAL SECTION.

mum heating effect. The figures given below were obtained from No. 6 barn at Chipoli, which is 20 ft. long and 18 ft. broad.

## TEMPERATURE OF BARN.

Thermometer	No. 1	No. 2	No. 3	No. 4	No. 5	Time. (28 min.)
Degrees	84	86	86	86	84	1.35 p.m.
	86	88	90	92	90	1.40 p.m.
	94	96	98	100	96	1.45 p.m.
	102	102	104	106	102	1.50 p.m.
	106	106	108	108	106	1.55 p.m.
	110	108	110	110	108	2.00 p.m.
	112	110	112	112	110	2.03 p.m.
Commencing to fall.						
Fuel all used up.	110	111	111	111	110	2.05 p.m.

This showed a rise in mean temperature of 26 degrees in 28 minutes by burning 20 lbs. of grass.

## De-suckering and Cultivating of Maize.

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The following communication was received recently by the Chief Agriculturist:—

“ During the course of a conversation last week I was confidently assured that experiments in America had proved the following two points:—

- (1) That suckering maize (i.e., removing the suckers) was detrimental to the crop.
- (2) That cultivating for ‘cultivating’s sake’ was unnecessary labour, and was only useful in so far as it removed the weeds.

“ Would you kindly give me your opinion on these points? ”

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As these matters are of general interest, we publish below the reply which was sent to the enquirer:—

**De-suckering of Maize.**—It is usually agreed that under normal conditions the de-suckering of maize of a non-stooling variety exerts very little influence on the yield of the crop. The evidence for and against is often conflicting, and, under climatic conditions such as obtained in many parts of the Colony last season, when the rainfall was fair up to tasselling period, and from then on was very deficient, de-suckering may prove advantageous if it is carried out sufficiently early. Removal of suckers tends to reduce the demands of the plant on the water supply in the soil. On the other hand, it is uncertain whether such increase in yield as may be secured will recompense the farmer for the extra expenditure of labour incurred. Generally speaking, therefore, de-suckering is not considered necessary or advisable, but if, towards the time of tasselling, the season turns very dry, and if the operation can be effected without any serious increase in cost of production, it may prove worth while.



The standard varieties of maize grown in Rhodesia do not normally produce an excessive growth of suckers, and do not usually produce good grain on the suckers. Certain varieties grown in other countries do so, and in such cases the removal of the suckers would, naturally, be detrimental. Excessive suckering here is usually due either to exceptional fertility of the soil, to a poorly selected strain of seed, or to a December or January drought followed by very favourable growing conditions.

**Cultivation of Maize.**—Without going fully into the controversial points regarding cultivation, there are several aspects which, when considered even for a moment, make it obvious at once that good cultivation in this country is advisable. First of these is the question of breaking up the soil-crust formed on nearly all our soils after a rain, in order to admit of the entrance of further rains into the soil. If this is not done by cultivation, the surface soil becomes parched and hard, and a large percentage of the succeeding rains will run off the land and be lost. Under the usual climatic conditions obtaining in this Colony this is a loss which should be guarded against.

Cultivation also has an important bearing on the question of soil erosion, inasmuch as, if the entry into the soil of rain-water is rendered easy by cultivation, the amount of water which will run off the land, carrying with it the richest portion of the soil, is restricted up to the point when the soil becomes saturated and can hold no more water. The depth of ploughing and humus content of the soil are other important factors influencing the water-retaining capacity of the soil. The actual value of the soil mulch produced by cultivation as a means of reducing losses of soil moisture is a much argued subject, and, under certain climatic and soil conditions, it may not be as effective as has been thought. In this Colony, however, there is ample evidence of the great effectiveness of frequent shallow cultivation in enabling crops to tide over periods of drought, and for this reason we strongly advise thorough cultivation and the maintenance of the soil mulch.

Finally, there is the question of keeping down weeds, and it remains to be explained how this can economically be done without recourse to cultivation.

S. D. T.

## Rhodesian Cattle for the English Market.

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We publish below some particulars of the prices realised in England for the consignment of 140 Rhodesian cattle despatched last July per S.S. Knowsley Hall. In considering these prices it might be explained that "price in sink" represents the sale of the complete carcase and includes the hide and the offal. The "beef" price represents the amount realised exclusive of hide and offal.

In order to gauge correctly the financial results of this shipment we will take Mr. Macarthur's cattle as a basis for calculation. Thus it will be seen that the net price realised per head for his cattle in England was £28 4s. 6d. From this must be deducted the freight and the railage, amounting to £15 13s. 7½d. Thus the net amount is reduced to £12 10s. 10½d. To this amount must be added the ¼d. per lb. bounty granted by the Rhodesia Government, which in the case of Mr. Macarthur's cattle amounted to £1 9s. 8¾d. per head. He also receives a rebate of half the railage, representing an amount of £1 8s. 2d. per head, and the net amount actually received is £15 8s. 9¼d.

We have not been advised of the live weight of the cattle in England, but from what we can gather there was not much variation in the weight as registered here. The average weights per beast of the various lots were as follows: Mrs. Templeton, 1,289 lbs.; Mr. D. Black, 1,235 lbs.; Mr. C. C. Macarthur, 1,435 lbs.; Gwebi Farm, 1,176 lbs.; Mr. J. R. Stewart, 1,250 lbs.; Mr. Rogers, 1,102 lbs.; Matopos Farm, 1,140 lbs.; Mrs. Worthington-Reid, 1,265 lbs.

Accepting the Rhodesia weights as the weights of the cattle in England, we see that Mrs. Templeton's cattle dressed at 55 per cent. of the live weight. Those interested can work out the other percentages on the same basis.

As we stated in the October issue of this Journal, the cattle arrived in excellent condition, and no casualties occurred during the voyage. A cabled report states that

this was the best consignment of cattle shipped from Africa, and that the quality was above the average run of English cattle. This has been corroborated by reports in the Press, which testify to the excellent quality of the meat. The prices realised are lower than they would have been had the cattle been sent earlier in the year. They are, however, testimony to the fact that we can breed the type of cattle required by the Home market, and we trust that the few consignments which have gone forward will mark the initiation of an extensive and profitable trade in live cattle. It is well that we should watch the English market closely, for, as we indicated in the editorial note which appeared in our October number, important developments may occur as a result of the shortage of beef in the United States of America.

W. E. M.

140 RHODESIAN CATTLE.

For account of Mr. J. R. Stewart, per S.S. Knowsley Hall.

*Freight Prepaid.*

Name	No. of Cattle	Gross Price Realised			Dead Weight	Fat, lbs.	Price in Sink	Beef	Offal	Hide	Breed *	Nett Price Realised			
Mrs. Templeton ...	19	£	s.	d.	715	32	d.	d.	d.	s.	d.	S	£	s.	d.
		28	10	8			9-9/16	7-5/16	1 <sup>5</sup> / <sub>8</sub>	59	10		25	9	5
D. Black ...	25	29	1	2	726	43	9 <sup>5</sup> / <sub>8</sub>	8	1-9/16	54	2	A	25	19	6
C. C. Macarthur	10	31	8	10	763	42	9 <sup>7</sup> / <sub>8</sub>	8 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	54	9	S	28	4	6
Gwebi Farm ...	10	26	13	2	625	35	10 <sup>1</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	1 <sup>3</sup> / <sub>4</sub>	50	1	S	23	13	10
J. R. Stewart ...	36	25	16	1	681	32	9 <sup>1</sup> / <sub>8</sub>	7-7/16	1 <sup>5</sup> / <sub>8</sub>	55	8	A	23	13	0
W. S. Rogers ...	9	21	15	8	612	20	8-9/16	6-11/16	1-13/16	60	1	...	19	16	6
Matopos Farm ...	21	24	17	7	655	29	9 <sup>1</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>2</sub>	1 <sup>5</sup> / <sub>8</sub>	52	7	S	22	3	10
Mrs. Worthington-Reid	10	26	18	2	697	31	9 <sup>1</sup> / <sub>4</sub>	7-11/16	1-9/16	53	6	S	24	8	0

\*In column "Breed" S means Shorthorn Grade  
A means Aberdeen Angus Grade



## Bee-Keeping in Rhodesia.

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By THOS. W. SAVORY.

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It is sometimes said that one cannot improve upon Nature, but here we find a decided exception to the rule, for unless men like Huber, Langstroth, Root, Miller, and many others of the pioneers of bee-keeping, had by their life-long experiments and work quite altered the habits of bees, the industry would never have progressed by leaps and bounds as it has done during the last 75 years and become the large undertaking it has to-day. With this knowledge before one, there is every encouragement for the enthusiast to break out into fresh channels of advancement, for there yet remains a great deal to be learned and improved upon, and some of the items that are to-day occupying the minds and work of keen apiarists are no more unreasonable than the movable comb, the extracting machine, the queen excluder, and the bee escape, all recent inventions, to say nothing of the intricacies of queen-rearing. The individual who can invent a ready-made drawn-out comb that the bees will accept will not only make a fortune, but will be hailed as a general benefactor. The aluminium production of this a few years ago was thought to usher in a new era in bee-keeping, but it has not yet been completed to suit the bee. Another item that many apiarists swear by is what is known in America as the Long hive. The first of these was used by A. O. Poppleton, one of the leading and most progressive beemen of the New World. He used this type to the exclusion of all other hives, carrying them hundreds of miles each year by river from place to place, and was never tired of singing its praises. The writer uses this kind in his own apiary in part, and finds it difficult to see any fault in it. It requires no excluder, bee escape, or movable ventilator. There is no taking it to pieces to examine the contents, there is no shifting of crates for extraction, no heavy weights to lift and carry, the heaviest article being

single deep frames, which, as handled, are placed into a box and carted up to the workshop. Then, again, the leading bee journals of the world are constantly giving out fresh ideas and labour-saving inventions, many of which are of the greatest use and value. The details of each fresh and useful idea or invention are at once copied into all the other journals, so all interested in the industry should make a point of subscribing to at least one of the bee papers.

Mr. Alexander's experience, as related in the *Rhodesia Agricultural Journal* of September, 1926, as to the temper of the Rhodesian bee is very correct, and until a more gentle and more docile queen—*vide* the Italian—is generally introduced and propagated, the ordinary beeman here will always have trouble in requeening and in the general handling of the single or double brood chamber. This reference does not include the Krantz bee, which should, under no circumstances whatever, be kept, for it is untameable and dangerous to have anything to do with. As a honey getter it is doubtful if there is any race of bees that can excel the ordinary Rhodesian bee, although, as has been before mentioned, there are busy and idle ones.

The apiarist should always be suitably clothed when entering the apiary; to do without a veil is not only foolish, but dangerous, and might easily lead to serious trouble by wholesale stinging. The writer uses a bee-proof suit in the shape of workmen's overalls, i.e., khaki trousers carried up to the breast in one piece, hanging on shoulder straps, over which is placed a headpiece of calico, fitting over the hat or helmet, with a frame of gauze netting let in for eye usage, of say 4 ins. x 8 ins. This, with full sleeves brought down to the wrists, with a pair of gloves with the finger tops cut off, makes an entirely bee-proof suit, ankles and wrists being further protected by small straps or string.

In advising the provision of a regular store of water for the apiary it was omitted to say that a trifle of salt and a dash of vinegar should always be added, as such tends to keep the bodies and intestines in better order and condition.

Presuming that each two hives are on one stand of say 5 ft. x 1 ft. 9 ins., a considerable improvement upon hive stands can be made as follows: Prepare a brick platform 6 ft. x 3 ft., three to six inches above the ground (if in



cement, all the better), and on this place the stand. This not only keeps the grass from growing, but it also, as a rule, prevents white ants from building up, and so saves a deal of otherwise constant labour. The writer adopted this plan last winter, when the bees were more or less dormant, and found it paid handsomely. In the article dealing with extracting, when stating that all empty frames should be replaced on the hives to be cleaned up, it should have been added that, if not convenient to take these down at once to the apiary, the cleaning up can be done just as well by placing the crate or crates of the wet empty frames in the workshop or any shady spot, when the bees will quickly find them and suck them bone dry in a very short while. This, of course, would refer mainly to those frames which were required to be packed away for usage another time, but, if wanted to use again, then place them direct upon the hives they came off.

A small but useful alteration might be made to the August notes of last year, where it was stated that the back and side slats on the bottoms of the hives should be screwed on. These should be nailed and not screwed, for the reason that it is much easier to prise the slats off with the hive tool than to unscrew with a driver when putting the bee escape board under the crate before extracting; it is not only a much quieter job for the inmates, but easier for the operator when he is probably being worried by stray angry bees.

An item of much use that has not been touched upon is the necessity for a proper register to be kept of all hives, and the nature of each. After having listed the final costs of the plant down to the last colony hived, including buildings, hives, labour and all spare parts, each hive should have a separate page, on which should be entered dates of hiving, number of frames given, with any other details as they may occur. This makes a record in which may be found at any time the life history of each hive, its characteristics, yield, etc., and at the end of each season such a record should show plainly the true condition of the apiary, as with any other department of the farm.

Mention has not yet been made of the important part that the honey bee takes in the actual production of fruit on the farm, and it is often urged that for this reason alone every farmer should own at least from two to four hives. All



experts of fruit farming agree in admitting that the bee performs a great service to this branch of industry, and a large amount of data has been given by scientific and practical men to this purpose. A Professor of the College of Agriculture of the University of California recently published some of his notes, of which the following is only one extract: "On trees covered and uncovered the blossoms varied from 32 to 399, smallest and largest; the percentage of the same which developed was from two to twenty. Another trial gave a result of 21 per cent. more seeds, another was a total failure against production." Another dictum was, "Bees and fruit go together; I cannot raise fruit without bees." In the State of Michigan a convention of fruit growers acknowledged generally that the keeping of bees in their orchards was an important factor in the production of fruit. A Professor of Cornell University says: "Bees are much more efficient agents of pollination than wind in our fruit, and their absence is always deleterious"; and similar testimony from the world's leading agriculturists and horticulturists could be multiplied indefinitely. It is well known that to-day many of the large fruit growers in various parts of the world pay bee-keepers so much per hive to bring them on to their orchards.

A few remarks on co-operation many now bring these articles to an end, and, though it has been left to the last, it is probably the keystone of the whole industry. Here may be quoted a few lines tucked away in other matter in the last issue of "Gleanings in Bee Nature" that well bear on this question: "The great progress that has been made in the industry during the past half century is largely a result of experimental work carried on by thousands of enthusiastic bee-keepers who reported their findings in the bee journals." As long as it is left to the single individual to plod along with apiary work as he best can alone, so long will the industry lag behind and make but little real progress. If, however, the country can only get a few really live bee-keepers to work together for the general good of the industry and to help each other by advice, by experience, by questions, by records of success or of failure, so will this part of the world in due course follow in the footsteps of other countries, where bee-keeping has been built up on a firm, lasting and

payable basis. A Rhodesian bee-keepers' association, however small to start with, might easily be the forerunner of the Colony obtaining imported Italian queens, moderate and uniform prices for all requisites, a probable recognition of its status by the respective Governments, and their assistance in various ways. There are so many factors pertaining to the industry obtaining north of the Limpopo so utterly different from those obtaining in the Union that bee-keeping here is a new industry. It is therefore of the greatest importance that experience gained by the individual be made available for all, so that from the sum total of our knowledge may be evolved a definite line of action.

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## Sales of Fat Stock from the Gwebi Farm.

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On the 17th October a truck load (ten) of fat bullocks were consigned from the Government Farm, Gwebi, to the Johannesburg Quarantine Market.

The prices realised were:—

Four head sold at £15 17s. 6d.

Three head sold at £15 15s.

Three head at £14 10s.

An average price of £15 7s. 6d.

The bullocks were from five to six years old, and were specially bought for fattening last March at £5 10s. each. They were fattened in open yards for about three months, the cost of food and attendance being estimated at less than £4 per head. Inclusive selling charges for railage, commission fees, etc., amounted to approximately £2 12s., and the profit on the fattening was thus about £3 5s. 6d. per head, making no allowance for the manure made during the fattening period.

On the 31st October two truck loads of fat stock were railed from the Government Farm, Gwebi, to the Johannesburg Quarantine Market. The bullocks were from five to six years old, and were bought last March, off the grass, at £5 10s. each. Cost of feeding and attendance is estimated by the Department of Agriculture to have been less than £4 per head, and railage, commission charges, etc., amounted to about £2 14s. per head.

The prices realised were:—

Three bullocks at £20.

Six bullocks at £18 7s. 6d.

Five bullocks at £17 12s. 6d.

Four bullocks at £14 10s.

Two fat cows at £15 5s.

Average price for bullocks, £17 11s. 6d.

The profit on the bullocks was thus in the neighbourhood of £5 7s. 6d. a head, allowing no credit for the manure made during the fattening period.

(Note.—Details of costs of feeding will be published later, when all the oxen fattened have been sold.—Ed., *R.A.J.*)

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## Government Farm, Matopos.

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### FOR SALE.

Pedigree Large White Pigs, Young Boars and Gilts, Prices on enquiry.—Apply to Manager, Government Farm, Matopos, Private Bag, Bulawayo.



## Movements of New Settlers.

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The following new settlers arrived in this Colony during the month of October, 1928:—

R. W. Wilde and Daughter.—Arrived from Great Britain on 1st October and joined his son at Usaka, Concession.

J. McMaster.—Arrived from Great Britain on 2nd October and proceeded to Mr. Chalmers, Patterson, Selby, for a period of training.

J. Dixon.—Arrived from Great Britain on 2nd October and proceeded to Mr. Millar, Estes Park, Selby, for a period of training.

Mr. and Mrs. F. E. Barnes.—Arrived from Australia on 3rd October on tour of inspection.

A. W. Brown.—Arrived from Great Britain on 8th October on tour of inspection.

F. K. S. van Ellinckhuysen and Son.—Arrived from the Union on 8th October on tour of inspection.

H. S. de Kok.—Arrived from the Union on 8th October on tour of inspection.

J. Chester.—Arrived from the Union on 10th October on tour of inspection.

T. E. Preston.—Arrived from Great Britain on 13th October and proceeded to Mr. Blackwell, Howgate, Macheke.

Mr. and Mrs. G. W. Watkinson and Mrs. Watkinson, sen.—Arrived from Great Britain on 19th October and are staying with Mrs. Jenkinson, Chisipiti, Salisbury.

Mr. and Mrs. Rex James.—Arrived from Kenya Colony on 23rd October on tour of inspection.

Mrs. A. B. Parker.—Arrived from Great Britain on 26th October and joined Mr. Parker on Chikoma Chimunga, Banket.

L. A. Heatley.—Arrived from Northern Rhodesia on 26th October on tour of inspection.

Mr. and Mrs. A. G. Bennett.—Arrived from Great Britain on 31st October and proceeded to Mr. Parsloe, Lyne Farm, Salisbury, for a period of training.

# Southern Rhodesia Veterinary Report.

September, 1928.

## AFRICAN COAST FEVER.

Two cases occurred at the infected farm Morgenson, Melsetter district.

Microscopic examination of smears taken from a two-year-old beast slaughtered for food on Railway Block No. 1, Gwanda district, showed bodies indistinguishable from Koch's bodies. The area involved was placed in quarantine and the usual steps taken for preventing the spread of infection.

## ANTHRAX.

One case occurred on Kirby Block, Bulalima-Mangwe district. All cattle involved were vaccinated.

## TRYPANOSOMIASIS.

A few deaths in cattle reported from the Melsetter and Makwiro districts.

## SCAB.

One outbreak of scab in sheep in the Melsetter district and two in the Gwelo district were dealt with.

## TUBERCULOSIS.

Eleven cows ex Cape which had re-acted to the tuberculin test were destroyed at Bulawayo. Positive microscopic lesions were found in nine head.

## IMPORTATIONS.

From the Union of South Africa: Bulls, 14; cows and calves, 60; heifers, 16; horses, 16; mules, 36; donkeys, 105; sheep, 1,518; goats, 534.

## EXPORTATIONS (CATTLE).

To the Union of South Africa: For local consumption, 879; for overseas export, 571. To Belgian Congo: Slaughter, 2,076; breeding, 147. To Northern Rhodesia: Breeding, 4. To Portuguese East Africa: Slaughter, 32.

## EXPORTATIONS (MISCELLANEOUS).

To Northern Rhodesia: Horses, 2; sheep, 162; goats, 3. To Belgian Congo: Pigs, 88; sheep, 105; goats, 65. To Union of South Africa: Pigs, 33. To Portuguese East Africa: Sheep, 35; goats, 35. To Bechuanaland Protectorate: Mules, 2.

## EXPORTATIONS TO BELGIAN CONGO IN COLD STORAGE.

Beef, 10 carcasses; pork, 17 carcasses; lamb, 10 carcasses; turkeys, 2 cases (9); chickens, 12 cases (140); ox brains, 2 cases (121); livers (sheep), 10; livers (calf), 14; tongues (sheep), 48; hearts (sheep), 118.

J. M. SINCLAIR,

Chief Veterinary Surgeon.

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## Notice.

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The Veterinary Department, Salisbury, now supplies blue tongue vaccine for the inoculation of sheep at one penny per dose, wire worm remedy at 1s. 3d. per tin of 100 doses, and dosing outfits complete, 12s. 6d.

Cash should accompany orders.



## Southern Rhodesia Weather Bureau.

OCTOBER, 1928.

*Pressure.*—During the month the mean barometric pressure was low, with a falling gradient from east to west. Livingstone was lowest with a pressure of 0.059 in. below normal, and Umtali highest with a pressure of 0.007 in. above normal.

The month of October was marked by the tendency for the equatorial low to operate on the west coast instead of through the Kalahari. The behaviour of the highs has also been unusual; there appears to have been high pressure in the Mozambique Channel for the greater part of the month. One normal cycle occurred during mid-October. A southerly low appeared off the south-east coast on the 17th in conjunction with the equatorial low. It was immediately followed by a high, which weakened rapidly, and the resulting rain was negligible. A southerly low passed through the country on the 26th. The succeeding high pressure was again exceedingly weak, and very little precipitation occurred.

*Temperature.*—The mean temperatures during the month were very high, in many cases the highest recorded. They varied from 5.4° F. above normal at Tuli to 0.5° F. above normal at Wankie.

The mean maximum varied from 9.5° F. above normal at Tuli to 0.5° F. at Wankie.

The mean minimum varied from 3.4° F. above normal at Melsetter to slightly below normal at several stations.

The relative humidity was very low, except in the Melsetter area, where it was about normal.

*Rain Periods.*—Precipitation occurred during two periods. From the 18th to the 21st light showers fell in Matabeleland, and from the 25th to the 28th showers occurred in North Mashonaland.

*Rainfall.*—The rainfall for the month amounted to 0.14 in., as compared with a normal of 1.00 in. It was distributed as follows:—

Zone.	Rainfall, in., October, 1928.	Normal, October.
A ... ..	0.08	0.80
B ... ..	0.06	0.90
C ... ..	0.16	1.08
D ... ..	0.31	0.94
E ... ..	0.07	1.20
F ... ..	0.11	1.91

Comparing the above figures with past records for the whole country, drier Octobers were experienced in 1905-6 and 1914-15. A similar total occurred in 1912-13. In 1912-13 the seasonal total was four inches below normal, in 1913-14 it was five inches below normal and in 1914-15 it was eight inches below normal.

The number of occasions in which the rainfall has been lower are as follows: Zone A, 3; Zone B, 3; Zone C, 2; Zone D, 6; Zone E, 1; Zone F, 1.

## RAINFALL.

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
ZONE A. :				
Bubi—				
Bembesi Railway	...	...	...	.96
Glenarton	...	...	...	.99
Inyati	...	.06	.06	1.02
Judsonia	...	...	...	n.s.
Martha Farm	...	.11	.11	.88
Nduba Farm	...	...	...	n.s.
Shangani Estate	...	...	...	.94
Bulalima-Mangwe—				
Centenary	...	.54	.54	n.s.
Kalaka	...	1.90	1.90	.94
Riverbank	...	1.01	1.04	.96
Solusi Mission	...	.46	.46	1.00
Bulawayo—				
Fairview Farm	...	.17	.17	.91
Keendale	...	.20	.20	.90
Lower Rangemore	...	.48	.48	.97
Observatory	...	...	...	1.00
Waterworks	...	.82	.82	.96
Gwelo—				
Brockenhurst	...	.33	.33	n.s.
Frogmore	...	.29	.35	n.s.
Gwelo Gaol	...	.26	.29	1.09
Riversdale Estate	...	.13	.13	1.20
Somerset Estate	...	.10	.10	1.04
Insiza—				
Orangedale	...	.47	.96	1.16
Shangani	...	.05	.09	.96
Thornville	...	.42	.49	1.03
Nyamandhlovu—				
Gwaai Reserve	...	1.97	2.01	1.15
Gwaai Siding	...	.02	.03	n.s.
Naseby	...	.50	.52	.91
Nyamandhlovu Railway	...	.65	...	.94
Sebungwe—				
Gokwe	...	.05	.05	1.17
Umzingwane—				
Springs	...	.15	.47	1.00
Wankie—				
Dett	...	1.25	1.25	1.13
Matetsi Railway	...	.05	.08	1.23
Ngamo Railway	...	.09	.18	1.19
Rosslyn	...	...	...	n.s.
Sukumi	...	.57	.80	1.26
Tom's Farm	...	.07	.27	n.s.
Victoria Falls	...	...	...	n.s.
Victoria Falls Railway	...	.33	...	1.15
Wankie Hospital	...	.08	.09	.95
ZONE B. :				
Belingwe—				
Bickwell	...	...	.17	1.31



## RAINFALL—(Continued).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
ZONE B.—(Continued)				
Belingwe (continued)—				
Sovelele	... .06	... .	... .	1.27
Tamba	... .	... .20	... .20	1.18
Wedza	... .09	... .	... .	1.42
Bulalima-Mangwe—				
Bruwapeg	... .	... .23	... .36	1.07
Edwinton	... 1.14	... .	... 1.14	1.23
Empandeni	... .15	... .10	... .35	1.19
Fallowfields	... .22	... .07	... .54	n.s.
Garth	... .49	... .	... .62	1.40
Maholi	... .18	... .10	... .35	1.28
Retreat	... .56	... .01	... .57	1.23
Sandown	... .75	... .06	... .81	1.30
Semokwe Reserve	... .03	... .14	... .35	n.s.
Tjankwa	... .49	... .03	... .52	1.34
Tjompanie	... .53	... .	... .	1.29
Chibi—				
Bubye	... .	... .	... .	.85
Mtendelende	... .13	... .	... .	1.23
Nuanetsi Homestead	... .45	... .	... .45	.88
Nuanetsi N.C.	... .08	... .11	... .46	n.s.
Gwanda—				
Gwanda Gaol	... .	... .08	... .26	1.16
Limpopo	... .	... .	... .20	.67
Mazunga	... .	... .	... .	.91
Mtetengwe	... .	... .	... .	.68
Tuli	... .	... .20	... .32	.79
Insiza—				
Albany	... .	... .	... .	1.24
Filabusi	... .	... .	... .	1.19
Fort Rixon	... .	... .	... .	1.29
Inyezi	... .	... .	... .37	1.21
Lancaster	... .	... .05	... .05	1.26
Scaleby	... .	... .	... .29	n.s.
Wanezi Mission	... .	... .	... .10	n.s.
Matobo—				
Bon Accord	... .	... .03	... .03	n.s.
Fort Usher	... .07	... .05	... .12	n.s.
Holly's Hope	... .05	... .11	... .31	1.20
Longsdale	... .37	... .	... .37	n.s.
Matopo Mission	... .	... .	... .12	1.47
Mtshabezi Mission	... .01	... .04	... .22	1.23
Rhodes Matopo Park	... .22	... .	... .22	1.32
Umzingwane—				
Balla Balla	... .10	... .	... .	1.33
Essexvale	... .20	... .03	... .39	1.30
Hope Fountain	... .	... .	... .	1.42
ZONE C.:				
Charter—				
Bushy Park	... .	... .	... .	1.34

## RAINFALL—(Continued).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
ZONE C.—(Continued)				
Charter (continued)—				
Enkeldoorn	...	...	.03	1.38
Marshbrook	...	...	...	1.33
The Range	...	.04	...	1.43
Vrede	...	...	...	1.33
Chilimanzi—				
Beacon Hill	...	.19	.21	1.45
Central Estates	...	.13	.13	1.40
Fourie's Post	...	...	...	1.23
Orton's Drift	...	...	...	1.40
Sebakwe Post	...	.15	.15	1.33
Umvuma Railway	...	...	...	1.29
Gwelo—				
Cross Roads	...	.34	.34	1.23
Delano Estate	...	.29	.29	n.s.
East Clare Ranch	...	.10	.10	1.30
Forestvale	...	.01	.79	n.s.
Globe and Phoenix Mine	...	.56	.56	1.28
Lannes Farm	...	.07	.07	n.s.
Lalapanzi	...	...	...	1.43
Lyndene	...	.16	.21	1.20
Woodendhove	...	.19	.19	1.34
Wold Farm	...	.40	.43	n.s.
Hartley—				
Ardgowan	...	...	...	1.44
Balwearie	...	...	...	1.66
Battlefields	...	...	...	1.31
Beatrice	...	.44	.44	1.49
Carnock	...	.04	.02	1.44
Cromdale	...	...	...	1.43
Currandooley	...	...	...	n.s.
Eiffel Blue Mine	...	...	...	1.05
Elvington	...	.13	.13	1.42
Gatooma	...	.02	.10	1.46
Gatooma Experiment Station	...	...	...	n.s.
Gowerlands	3.85	...	3.85	1.37
Handley Cross	...	.17	.17	n.s.
Hartley Gaol	...	.28	.28	1.42
Hopewell	...	.20	.20	1.46
Jenkinstown	...	...	...	1.43
Maida Vale	...	...	...	1.28
Meadowlands	...	.20	.20	n.s.
Nyadgori	...	.17	.17	1.43
Pulham	...	.03	.05	1.51
Ranwick	...	.17	.17	1.41
Sunny Bank	...	...	...	n.s.
Thorndyke	...	.02	.57	1.31
Lomagundi—				
Argyle	...	.05	.05	1.34
Baguta	...	.07	.07	1.37
Between Rivers	...	.58	.59	n.s.

## RAINFALL—(Continued).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
ZONE C.—(Continued)				
Lomagundi (continued)—				
Citrus Estate	...	.13	.13	1.30
Dalston	...	.35	.35	n.s.
Dartmoor	...	.22	.22	n.s.
Darwendale	...	.80	.80	1.35
Devonia	...	.01	.01	1.32
Dingley Dell	...	...	...	1.15
Gambuli	...	...	...	1.46
Hartleyton	...	...	...	n.s.
Kapiri	.50	.04	.54	1.28
Kashao	...	.04	...	n.s.
Kenidia	...	.13	.13	n.s.
Mafoota	...	.04	.04	1.24
Maningwa	...	...	...	1.34
Miami	...	.07	.07	n.s.
Mica Field	...	.12	.12	1.13
Montrose	.14	...	...	1.25
Mpandegutu	...	.31	.31	1.37
Msina	...	...	...	n.s.
Mukwe River Ranch	...	...	...	1.26
Nyapi	...	.11	...	1.20
Nyarora	...	...	...	1.20
Nyati	...	.24	.24	1.11
Palm Tree Farm	...	.02	.02	1.34
Pendennis	...	...	...	n.s.
Raffingora	...	.10	.18	1.26
Renardia	...	.05	.05	n.s.
Richmond	...	...	...	.97
Robbsdale	...	.20	...	n.s.
Romsey	.07	...	.07	1.23
Silater Estate	...	.07	.07	1.28
Sinoia	...	.13	.13	1.35
Sinoia's Drift	...	...	...	n.s.
Sipolilo	...	...	...	1.34
Umvukwe Ranch	.09	.02	.11	1.37
Woodleigh	...	.01	...	1.31
Yeanling	.23	.01	.24	1.28
Zebra Vlei	.01	.07	.08	1.32
Marandellas—				
Rocky Spruit	.10	...	.10	n.s.
Mazoe—				
Pembi Ranch	...	...	...	n.s.
Salisbury—				
Avondale (Broadlands)	...	.37	...	1.40
Ballineety	.01	...	.01	1.57
Botanical Experiment Station	.05	...	...	1.37
Bromley	.02	...	.02	1.44
Cleveland Dam	.02	.02	.04	1.37
Forest Nursery	...	.20	.20	1.42
Gwebi	...	.18	.18	1.41
Salisbury Agricultural Dept.	.16	.35	.51	1.40



## RAINFALL—(Continued).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
ZONE C.—(Continued)				
Salisbury (continued)—				
Sebastopol ...	...	1.03	1.03	1.45
Stapleford ...	...	.02	.02	1.47
Tobacco Experiment Station ...	.28	.19	.47	n.s.
Western Commonage ...	.15	.17	.32	1.46
Sebungwe—				
Sikombela ...	...	.30	.30	1.42
Wolverley ...	...	.25	.25	1.35
ZONE D. :				
Darwin—				
Chikoa ...	...	...	...	n.s.
Cullinan's Ranch ...	...	...	...	n.s.
M'gadzi ...	...	...	...	n.s.
Mount Darwin ...	...	...	.15	1.21
Rusambo ...	...	...	...	n.s.
Inyanga—				
Inyanga ...	.03	.31	.37	1.48
Juliasdale ...	.49	.04	1.67	1.67
Rhodes Estate ...	...	.25	1.27	1.54
Makoni—				
Ardlamont ...	.99	.26	1.25	n.s.
Eagle's Nest ...	.17	.17	.40	1.32
Mayo Ranch ...	...	.72	.72	n.s.
Wensleydale ...	.10	.40	.50	1.23
Mazoe—				
Argyle Park ...	.02	.19	.21	n.s.
Atherstone ...	...	.05	...	1.12
Bellevue ...	...	.18	.20	n.s.
Bindura ...	...	...	...	1.32
Ceres ...	...	.21	.21	1.42
Chipoli ...	...	.07	.07	1.27
Citrus Estate ...	...	.05	.05	1.28
Craigengower ...	...	.02	.02	1.24
Dandejena ...	...	.02	.02	n.s.
Donje ...	...	...	...	n.s.
Frogmore ...	...	...	...	1.11
Glen Divis ...	.08	...	.08	1.29
Glen Grey ...	...	.04	.06	1.05
Great B ...	...	...	...	1.19
Hinten ...	...	...	...	n.s.
Horta ...	...	...	...	1.28
Kilmer ...	...	.02	.02	1.27
Kingston ...	...	...	...	1.42
Maienza ...	...	...	...	1.19
Mazoe Dam ...	...	...	...	1.43
Mgututu ...	...	...	...	1.29
Muripfumba ...	...	...	...	1.09
Omeath ...	...	.02	.02	1.25
Pearson Settlement ...	...	...	...	1.19
Riversdale Estate ...	...	...	...	n.s.

## RAINFALL—(Continued).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
Zone D.—(Continued)				
Mazoe (continued)—				
Ruia	...	...	.03	1.40
Rustington	...	...	...	1.10
Shamva Mine	...	.01	.01	1.32
Stanley Kop	...	...	...	1.23
Sunnyside	...	.06	.06	1.30
Teign	...	...	...	1.34
Usk	...	...	...	1.42
Virginia	...	.07	.07	1.22
Visa	...	...	...	n.s.
Woodlands	...	.17	.17	1.30
Zombi Farm	...	.01	.02	1.40
Mrewa—				
Maryland	...	...	...	1.32
Montclair	...	.20	.92	n.s.
Mrewa	...	...	...	1.38
Nyaderi Mission	...	.50	.50	n.s.
Selous Nek	...	...	...	1.32
Mtoko—				
Makaha	...	1.63	1.74	1.25
Mtoko (N.C.)	...	...	...	1.10
Rukore	...	...	...	n.s.
Salisbury—				
Arcturus	...	1.40	1.40	1.45
Chindamora Reserve	...	.23	.23	1.30
Datata	...	.04	.07	n.s.
Glenara	...	...	.18	1.24
Goromonzi	...	...	.20	1.50
Hatcliffe	...	...	.09	1.32
Hillside (Bromley)	...	...	...	1.38
Kilmuir	...	...	.18	1.48
Meadows	...	...	.25	1.50
Pendennis	...	...	...	n.s.
Selby	...	...	...	1.20
Springs	...	...	...	n.s.
Teviotdale	...	...	.16	n.s.
Vainona	...	...	...	1.31
ZONE E.:				
Belingwe—				
Belingwe (N.C.)	...	...	.17	1.32
Doro	...	...	...	1.40
Shabani	...	...	.01	1.52
Bikita—				
Angus Ranch	...	.39	.59	1.35
Bikita	...	1.06	.09	2.24
Devuli Ranch	...	.85	.85	1.19
Pamushana	...	.70	.11	2.16
Charter—				
Buhera	...	.09	.12	1.96

## RAINFALL—(Continued).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
ZONE E.—(Continued)				
Chibi—				
Chibi	...	.04	...	1.32
Lundi	.28	...	...	1.20
Mpapas	...	...	...	1.20
Chilimanzi—				
Allanberry	.05	...	...	1.58
Driefontein	.12	.01	.25	1.54
Felixburg	...	...	...	1.70
Grootfontein	.03	...	.03	1.64
Induna Farm	...	.02	.10	1.78
Mtao Forest	...	.10	.17	1.68
Mukowries	.09	...	.29	n.s.
Thornhill	...	...	.07	n.s.
Gutu—				
Alheit Mission	...	...	...	1.31
Chindito	...	...	...	1.83
Eastdale Estate	...	...	.11	1.79
Gutu (N.C.)	.06	...	...	1.70
Glenary	...	...	.16	1.46
Gwelo—				
Glencraig	...	.40	.42	n.s.
Partridge Farm	...	.48	.60	2.00
Sheep Run Farm	...	...	...	1.67
Inyanga—				
St. Trias' Hill	.33	...	.56	2.16
Insiza—				
Roodeheuvel	...	...	...	1.49
Stoneham (Brac Valley)	.17	.09	.67	n.s.
Makoni—				
Bude	.03	.02	.43	n.s.
Chirumwe	...	...	...	n.s.
Craigendoran	.02	.07	.38	1.65
Forest Hill	.21	.08	.58	1.74
Gorubi Springs	.03	.23	.81	1.77
Inyagura	.43	.18	.61	n.s.
Mona	.56	.27	1.13	1.97
Monte Cassino	.05	.24	.29	1.94
Ruati	...	.50	.72	n.s.
Rusape (N.C.)	...	...	...	1.70
Springs	2.50	.09	2.75	1.75
Tablelands	.03	.29	.81	2.06
Whitgift	.02	.05	.37	n.s.
Marandellas—				
Bonongwe	...	.05	.05	1.81
Delta	...	...	.12	1.79
Elandslaagte	.02	...	.08	1.77
Lushington	...	...	...	n.s.
Macheke	.04	.02	.09	1.97
Marandellas (N.C.)	.07	.06	.13	2.05
Marandellas Estate	...	...	...	1.81



## RAINFALL—(Continued).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.
	Sept.	Oct.		
ZONE E.—(Continued)				
Marandellas (continued)—				
Nelson	...	...	...	1.59
Wedza Reserve	...	.01	.23	n.s.
Wenimbi	...	...	...	n.s.
Melsetter—				
Brackenbury	...	.37	...	2.90
New Year's Gift	...	1.05	1.68	n.s.
Sabi Tanganda Estate	...	.84	1.16	n.s.
Tom's Hope West	...	.80	2.85	n.s.
Ndanga—				
Bangala Ranch	...	...	...	n.s.
Doornfontein	...	1.09	1.50	1.47
Marah Ranch	...	...	...	1.75
Triangle Ranch	...	...	...	1.31
Zaka	...	.62	1.43	2.16
Selukwe—				
Aberfoyle Ranch	...	.39	.83	1.75
Hillingdon	...	...	...	1.77
Impali Source	...	.01	.46	1.69
Rio	...	.08	.16	1.65
Safago	...	.05	.77	1.82
Selukwe Gaol	...	.18	1.38	2.24
Umtali—				
Argyle	...	.05	.31	1.75
Embeza	...	1.96	3.97	n.s.
Fairview	...	...	...	n.s.
Fern Valley	...	.12	.76	1.99
Jerain	...	.05	.56	1.79
Mutambara Mission	...	...	.09	1.65
Odzani Power Station	...	...	.04	2.03
Park Farm	...	.81	3.10	2.39
Premier Estate	...	.46	.80	1.71
Sarum	...	...	.02	1.59
Sheba	...	1.53	7.03	n.s.
Stapleford	...	1.36	...	3.98
St. Augustine's Mission	...	.58	2.92	3.33
Transsau Estate	...	...	...	1.69
Umtali Gaol	...	.39	.63	1.83
Victoria—				
Brucehame	...	1.46	1.75	1.55
Cambria	...	.85	1.01	1.49
Cheveden	...	1.67	2.25	2.11
Clipsham	...	.85	1.24	1.59
Gokomere	...	.22	...	1.61
Kimberley Ranch	...	.76	.90	n.s.
Mashaba	...	.86	1.19	n.s.
Miltonia	...	...	...	n.s.
Riverdene North	...	.76	1.03	1.64
Salemore	...	1.03	...	1.81
Silver Oaks	...	1.04	1.20	1.59

RAINFALL—(*Continued*).

STATION.	1928.		Total to end of period.	Normal rainfall to end of period.	
	Sept.	Oct.			
ZONE E.—(Continued)					
Victoria (continued)—					
Stanmore	...	.52	...	1.48	
Victoria	...	.85	.91	1.47	
Zimbabwe	...	1.08	...	1.97	
ZONE F.:					
Melsetter—					
Chikore	...	.97	.02	1.88	3.21
Chipinga	...	...	.08	...	3.32
Lettie Swan	...	1.63	.21	4.28	n.s.
Melsetter	...	1.20	...	2.47	3.51
Mount Selinda	...	1.56	.17	2.43	4.66
Vermont	...	4.22	.19	9.65	3.72
Umtali—					
Chimeze	...	...	...	...	3.43
Cloudlands	...	...	...	...	n.s.

# Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Dec.	Jan.
Ayrshire—Sipolilo -	Various farms	G. H. Cauterley -	1928	1929
Banket Junction -	Banket Hotel	A. M. Hutchinson -	8	12
Beatrice District -	Farmers' Hall, Beatrice	W. Krienke -	7	4
Bindura -	Bindura Farmers' Hall	W. E. Fricker -	27	31
Bromley -	Farmers' Hall, Bromley Siding	E. Somerville-Collie -	14	11
Bubi -	Queen's Mine	C. H. Olsen -	5	2
Bulawayo Landowners' and Farmers' Association	Library Buildings, Bulawayo	W. A. Carnegie -	11	8
Chakari -	Turkoi's Mine (Dec.), Balwearie (Jan.)	L. T. Tracey -	13	10
Daisyfield -	Daisyfield (Dec.), Somabula (Jan.)	L. E. Edwards -	19	16
Darwendale—Trelawney	Various farms	Charles H. Tanner -	15	12
Eastern Districts -	Farmers' Hall, Chidza	W. E. Richards -	26	23
Enkeldoorn -	Enkeldoorn	C. N. Ludlowe -	8	12
Enterprise -	Farmers' Hall	James Watson -	4	1
Essexvale -	Essexvale	Col. D. Judson -	4	1
Felixburg—Gutu	Blyth (Dec.), Glenary (Jan.)	A. J. Bradshaw -	16	20
Figtree Branch, R. L. and F. A.	Figtree Hotel	The Secretary -	8	12
Gadzema -	Gadzema	M. G. Leahy -	4	1
Gatooma -	Speck's Hotel	J. A. Smith -	14	11
Gatooma (Golden Valley Branch)	Golden Valley Hotel	C. A. K. Beaton -	15	19
Gazaland (South Melsetter) -	Chipinga Hotel	Mrs. C. N. Reading -	8	12
Greystone -	Quarrie Farm	P. J. van der Walt -	3	7
Gwanda -	Lowenthal's Building, Gwanda	N. J. B. Nilson -	15	12
Hartley -	Old Schoolroom, Hartley	E. Etheredge -	15	19
Headlands -	Headlands	J. A. Eve -	22	26
Hunter's Road -	Hunter's Road	R. W. Twilley -	22	26
Inisa South -	Farm Lancaster	J. Campbell -	29	26
Inyazura -	Inyazura	W. P. Frudd -	13	10
Lalapansi -	Lalapansi	Edmund Chapman -	7	12
Lomagundi -	Sinoia	F. W. Robertson -	8	12
Lomagundi West -	Various farms	A. A. Bisset -	9	13
Macheke -	Farmers' Hall, Macheke	The Secretary -	...	...



Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	T. R. Colam	1	5
Makwiro	Makwiro	F. H. Howard	21	18
Marandellas	Marandellas Farmers' Hall	E. Cruikshank	7	4
Marandellas, Southern	Various farms	D. L. Gale	5	2
Mashonaland	Mashonaland Farmers' Hall, Salisbury	C. Lamb	14	11
Matobo Branch	Farmers' Hall, Malundi Farm	A. G. Allen	15	..
Matopo Branch, R. L. and F. A.	Farmers' Hall, Malundi	W. Mirtle	15	19
Mazoe (Concession)	Concession Hotel	Frank Allen	14	11
Mazoe (Glendale)	Farmers' Hall, Glendale		12	9
Melsetter	Court House, Melsetter	Dr. Rose	13	10
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	12	9
Ngezi-Umniati	Harvieston, Enkeldoorn	Miss Harvie	29	26
North Umniati		J. F. Eagar	Not received	
Norton and Lydiat District	Norton	R. D. Palmer	7	4
Nyanandhlovu	Nyanandhlovu	R. D. McLean	..	..
Odzi District Farmers	Odzi Hotel	F. H. Burnett	1	5
Poorle Valley	Various places	A. D. Wilson	15	19
Que Que	Offices of the Que Que Sanitary Board	J. Hogg	15	19
Rusape Farmers' Association	Rusape	R. Munch	1	5
Salisbury South	Various farms	P. Linton	26	30
Selukwe	The Hotel, Selukwe	W. T. Simpson	7	..
Shamva	Shamva Hotel	W. Stanley-Stollard	20	17
Two Rivers Farming Association	Various farms	W. L. Parsons	15	19
Umboe (Branch of Lomagundi F.A.)	Highbury (Dec.)	C. W. S. Ford	8	12
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	E. Wrightson	8	12
Umtali	Drill Hall, Umtali	A. Howat	6	3
Umvuma and District	Umvuma	H. B. Colling	Not received	
Victoria	Victoria	G. E. Lamb	1	5
Wankie District		W. Brownlee-Cumming	Not received	
Western	Plumtree Hotel	The Secretary	8	12
Willoughbys	Willoughbys	A. E. Roberts	Not received	

Export of Cattle from Southern Rhodesia, 1928.

Month	Union		Eng-land.	Congo		N. Rho- desia	Portuguese East Africa.			Total
	Slaughter		Slaugh- ter	Slaughter	Breeding	Breeding	Slaughter	Trek	Breeding	
	Johannes- burg	I.C.S. for overseas								
...	55	...	...	1,370	39	...	108	...	...	1,572
January	190	...	...	2,287	453	...	111	...	...	3,041
February	562	2,746	...	4,257	13	192	39	...	...	7,809
March	957	4,927	...	3,468	12	193	84	...	...	9,641
April	1,522	5,864	...	4,545	11	...	36	...	...	11,983
May	2,278	6,000	...	1,505	949	...	177	...	...	10,914
June	1,370	2,066	140	1,458	1,682	10	104	33	...	6,863
July	1,400	4,949	...	1,372	2,352	...	...	32	...	10,105
August	879	571	...	2,076	147	4	...	...	...	3,709
September	775	...	...	1,478	43	...	38	14	22	2,370
October	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...

J. M. SINCLAIR,  
Chief Veterinary Surgeon.

## Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
De Grendel Rita	Friesland	5,498.60	...	180	W. R. Blackwell, Norton
Home Park	do	8,113.00	...	300	R. G. Fox, Umtali
Mary III.					
Rathwick	do	5,178.50	...	240	do do
Princess IV.					
Home Park	do	7,370.25	...	240	do do
Elske V.					
Rathwick	do	7,076.50	...	240	do do
Maud III.					
Home Park	do	7,602.00	...	240	do do
Alma V.					
Rathwick	do	7,813.50	...	240	do do
Mermaid					
Umtali Nereid...	do	4,775.25	...	210	do do
Umtali Queen ...	do	4,644.75	...	180	do do
Home Park	do	6,093.50	...	180	do do
Agnes					
Umtali Mary ...	do	3,929.50	...	180	do do
Dapple ...	do	4,373.00	...	150	A. T. Holland, Chatsworth
Princess ...	do	4,585.00	...	180	do do
Rhoda ...	do	2,888.00	...	120	do do
Mary ...	do	3,111.00	...	120	do do
Boontje of	do	1,763.00	...	60	do do
Kaalplaats					
Palm Tree Milly	do	10,079.00	...	522	M. Inge, Sinoia
Palm Tree Neeltje	do	8,076.00	...	392	do do
Palm Tree Ethel	do	6,019.00	...	290	do do
Langton Nessie	do	2,927.00	91.92	189	do do
Langton June...	do	2,854.00	94.41	164	do do
Langton Daisy	do	1,785.00	66.74	116	do do
Erin-go-bragh	do	3,088.00	...	120	W. S. Mitchell, Iron Mine Hill
Groenvlei Bed-	do	7,512.05	...	210	P. T. Webb, Iron Mine Hill
ford Alberta					
De Grendel	do	10,214.50	318.41	264	Gwebi Experiment Farm
de Hoop					
De Grendel Roza	do	6,117.25	158.90	256	do do
De Grendel	do	10,119.25	267.67	248	do do
Froukje					
De Grendel	do	8,855.75	249.81	210	do do
Selma					
De Grendel Laura	do	5,068.25	148.86	175	do do
De Grendel	do	857.75	23.58	18	do do
Bessie Burger					
Wit Fancy ...	do	7,234.00	217.99	296	do do



## RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.	
Mimosa Pel Stiensers	Friesland	6,668.25	229.75	272	Gwebi Experiment Farm	
Mimosa Clara II.	do	7,264.25	233.60	217	do	do
Mimosa Clara X.	do	7,679.00	209.09	119	do	do
Melrose Corrie...	do	6,727.00	275.47	157	do	do
Melrose Roosje	do	3,823.25	94.69	93	do	do
Melrose Maandag	do	2,412.25	91.29	62	do	do
Fanny ...	Grade Friesland	10,719.75	341.40	332	do	do
Lucy ...	do	6,690.00	191.16	265	do	do
Kleinbloem ...	do	7,113.50	213.60	239	do	do
Hannah ...	do	10,619.50	330.33	240	do	do
Gladys ...	do	5,244.00	156.46	112	do	do
Roodebloem ...	do	906.00	23.25	49	do	do
Waterbloem ...	do	1,836.25	49.55	39	do	do
Gwebi Elsie ...	do	3,677.75	110.02	74	do	do
Gwebi Laura ...	Friesland	2,408.50	60.08	63	do	do
Allie ...	do	1,987.75	56.68	42	do	do
Isa ...	Grade Friesland	386.00	11.94	.8	do	do

# Farming Calendar.

## December.

### BEE-KEEPING.

With a normal season the first or main honey-flow of the year should now be over and the honey ready to be robbed. Before doing this, see that all or the main portion of the frames are capped and sealed, otherwise there will be trouble later on by fermentation. There is nothing on the market to equal the Porter bee-escape board to clear out the bees from the crate, but be sure and see that the board in question is placed the right side up under the crate; failure to do this (and in the hurry of the minute it can easily be so done) will result in the probable suffocation of the bees and the loss of the honey, to say nothing of the chances of robbing from any close-by hives. Replace the empty combs and frames as soon as possible on the hives, to be cleaned up and mended where necessary, and for future storage of more honey. During the very hot spells watch the hives and provide extra ventilation, by inserting small metal wedges between the crates, just wide enough to allow air in, but not a bee under any consideration. Keep all water tins under the hive-stand legs full of water, and see that water is available for the worker bee, which drinks a good deal. When extracting honey, do so in a bee-tight room or verandah, otherwise the operator may have a lot of trouble from other colonies, which quickly find where honey is. Always have one or more crates of shallow frames ready with foundation fixed to place on hives as the season may warrant; such will mean always something for the bees to work at, and during the last flow they may be invaluable to store any such catch crop of nectar, as from tobacco, etc., when the natural flora is finished.

### CITRUS FRUITS.

This is a good month to plant citrus trees into their permanent positions. They should on no account be planted deeper than they stood in the nursery. Water each tree immediately after planting it to settle the soil, then loosen the surface when sufficiently dry to check weed growth and restrict evaporation; continue loosening the surface soil after each rain or watering.

If good rains have fallen, disc the grove in two directions, then sow the cover crop and harrow also in two directions. If the grove is weedy it should receive a shallow ploughing in place of the discing. Then sow the seed and harrow the soil.

All bearing trees must be kept well watered if the weather continues to remain dry. Trees that suffer for want of moisture while the young fruit crop is developing will be adversely affected, and the crop—if any—will be of inferior quality.

Continue to rub off all water shoots or suckers which develop on the tree stems.

### CROPS.

Keep the cultivators going, both on planted and unplanted lands, whenever weather conditions are favourable. Destroy the weeds while young and before they obtain a firm root-hold.

Continue planting maize, cotton, beans and ground-nuts as early as possible this month, followed by sunflowers, Sudan grass, manna, pumpkins and cattle melons.

Linseed, cowpeas, teff grass, oats, sunn hemp, should be planted after the other crops are in.

Ensilage crops may be sown at the end of the month.

When harrowing maize after planting, this work should be done in the heat of the day when the young plants are flaccid and not easily broken.

On lands not yet planted the crop of weeds should be kept down by disc-harrowing.

It is a good plan to harrow or disc-harrow immediately before the planter, or alternatively to follow the planter with a light harrow.

Treat seed oats for smut before sowing. Use one pint of formalin to 25 gallons of water and steep the bag of seed for ten minutes.

Earth up early planted potatoes.

Keep a look out for the stalk-borer and top or otherwise treat affected plants.

New lands and old pastures may be broken, as circumstances permit, during December, January and early February, and again ploughed in from May to July. If they carry a heavy crop of grass it should be cut or burnt to enable good clean ploughing to be done.

Sweet potato slips should be planted early in this month. Do not fail to have in a few acres of this valuable crop.

#### DAIRYING.

During the months of December and January veld grazing is usually plentiful, and very little extra feed in the form of concentrates is required for dairy stock. It should be borne in mind, however, that heavy milking cows are unable to satisfy their requirements for milk production from veld grazing alone, and should receive a daily allowance of grain; the latter should be fed at the rate of 2 lbs. for every gallon of milk produced daily, i.e., a cow producing three gallons of milk should receive 6 to 7 lbs. of concentrates. An excellent mixture for this purpose is one consisting of four parts maize meal and one part ground-nut cake.

During wet weather, the provision of a clean dry shelter<sup>o</sup> for calves is essential; the latter should not be crowded together in a small, damp, badly ventilated pen or muddy kraal. When treated in this manner, a calf is very liable to contract various ailments such as scour, etc. Scour is entirely preventable, and is usually caused by over feeding, or feeding from dirty pails, feed boxes, etc. Calves which contract scour should be isolated, the milk ration reduced, and they should be dosed with a few tablespoonfuls of castor oil.

Under the weather conditions which now obtain, cream should be despatched to the creamery at least three times a week. It is of the greatest importance that cream should be cooled immediately after separation, and should be kept cool while on the farm and whilst in transit to the railway station or siding. While the cream is being cooled, it should be frequently stirred, using a stirrer with a plunger attachment. Warm, freshly separated cream should not be mixed with old cream which has already been cooled. Cool the fresh cream first and then mix thoroughly with the old cream. Gassiness is a common defect in the cream received at the creameries at this time of the year, and is caused by gas-producing organisms with which the milk and cream are contaminated. These organisms abound in mud, manure, etc., and develop and multiply very rapidly at high temperatures. Any precautions therefore which may be taken to eliminate dirt, manure, etc., from the milk and to keep the cream cool will prevent the development of gassiness.



As the night temperatures are fairly high, cheese-makers should not attempt to use night's milk for cheese-making; morning's milk plus a starter will give the best results. Gouda cheese-making operations are not usually successful at this season of the year, owing to the poor quality of the milk and the prevalence of gassiness. This type of cheese is best manufactured during March and subsequent months.

#### DECIDUOUS FRUITS.

Cover crops may be planted when the rains commence, as recommended under citrus fruits.

Summer pruning may be commenced this month. If all undesirable shoots are taken out of the trees, the remaining shoots will receive sufficient air and light to mature.

Ripening fruit must be carefully harvested, graded and packed if satisfactory prices are to be secured. Do not gather any fruit when it is wet.

Keep all recently planted trees in good condition; the first year's growth is the most important. If the undesired shoots are rubbed off when they first appear, the retained shoots will receive all the nourishment and the tree will then grow to a large size.

#### ENTOMOLOGICAL.

Maize.—The first half of this month appears to be the best period during which to plant maize for the avoidance of stalk borer attack—at least in the Salisbury district. Hoe out and remove volunteer maize plants before the new crop is up, as they are liable to be infested with borer, which tends to spread to surrounding plants. Red soils may be baited with chopped Napier fodder or other suitable greenstuff dipped in arsenite of soda 1 lb., cheapest sugar 8 lbs. or molasses 1 gallon, water 10 gallons, to destroy surface beetles, snout beetles and other insects which may affect the primary stand.

Tobacco.—The enemies of this crop are in general most active during December, whilst the crop is still in the early stages of growth.

For information regarding tobacco pests, see "Rhodesia Agricultural Journal," January, 1928, or Bulletin No. 665.

In general, poisoned baits may be used against surface beetles, grasshoppers, crickets and cutworms. Against surface beetles, arsenite of soda 1 lb. in 30 gallons of water used to moisten maize bran is a good bait. Against grasshoppers and crickets the addition of 8 lbs. sugar or 1 gallon molasses to each 1 lb. of arsenite of soda is recommended. Spray with arsenate of lead (powder) 1 lb. in 30 gallons of water against leaf-eating insects and as a protection against leaf miners and stem borer. Transplants may be dipped head downwards as far as the roots in the poison. Discard seedlings infested with stem borer and root gallworm.

Cutworms.—Keep ground around seed beds as free as possible from vegetation, to prevent female moths from laying eggs there. From the time the plants show foliage of the size of a sixpence they should be sprayed weekly with arsenate of lead (powder) 1 lb. to 30 gallons of water. This should prevent cutworms developing in the beds, as the young cutworms attack the leaves of the seedlings, and so ingest the poison.

House Flies.—With the coming of hot weather and the rains, house flies greatly increase, and should be kept out of dwelling houses by mosquito netting, or poisoned in the following way:—Dissolve 1 lb. of sodium arsenite in 10 gallons of water, and add about 10 lbs. of cheap sugar (2 gallons of treacle) or other sweet substance. The mixture should be sprayed upon branches of shrubs or trees, which may be hung up in convenient places where flies congregate. These insects are attracted to the bait, and are easily poisoned.

Mosquitoes, Stable Flies.—Destroy breeding places around homestead. Poison or trap adults.

Potatoes.—Ladybirds and caterpillars may be injurious to the foliage, and on sandy soils blue blister beetles sometimes cause damage. Spray with arsenate of lead (powder) 1 lb. to 25 gallons of water.

Kitchen Garden.—Marrows, etc., are commonly attacked by leaf-eating beetles. Spray with arsenate of lead (powder) 1 lb. in 25 gallons water, plus 8 lbs. cheapest sugar or 1 gallon molasses. Dusting lightly with pure arsenate of lead powder should give protection. Young plants of the cabbage family may be dusted with pure arsenate of lead powder or with such powder mixed with up to six or eight parts of finely sifted, thoroughly slaked lime as a protection against leaf-eating insects.

Fruit Trees.—The regular collection and destruction of fruit beetles may be necessary. Choice varieties of peaches, etc., may be netted as a protection against pests.

### FLOWER GARDEN.

This month is generally showery, and constant stirring of the soil is, therefore, necessary to keep it loose. Seeds of perennials and annuals for February blooms may be sown. Transplanting should be done in the evening or on a cloudy day. Carnations should be kept free from dead wood, and climbers attended to.

### VEGETABLE GARDEN.

All vegetable seeds may be planted. All advanced plants should be constantly cultivated. Potatoes should be ridged, and peas, beans and tomatoes staked. This is a good month for planting the main crop of potatoes.

### FORESTRY.

Preparation of land should be continued. If heavy rains have fallen during November and December, and inspection shows that the sub-soil is well saturated with water, tree planting operations may commence towards the end of the month. If insufficient rains have fallen, delay planting. Plant on dull rainy days or late in the afternoons. Take great care in setting out the plants. Avoid bending the roots, and do not plant deeper than the transplants were in the seed beds or trays.

### POULTRY.

The poultry keeper should take precautions whereby the wet weather will not affect his birds' health and their laying powers. All houses must be absolutely watertight, the floor raised well above the level of the surrounding ground, thus preventing water seeping in and making it damp. The birds themselves should not get wet, and no pools of water should be seen in the runs. Foodstuffs also must be kept absolutely dry.

Many birds will at present be moulting; these require special treatment to bring them through it quickly, and if possible keep them in lay during the period. A pamphlet on this can be obtained from the Poultry Expert, Department of Agriculture. This lack of attention to the birds during the moult is one of the causes of the scarcity of eggs at this season. There is no need for it if poultry keepers would only look after their birds properly.

Those who intend disposing of their turkeys for killing at Christmas must avoid cooping them up, as is done when fattening fowls, for they immediately mope and go off their food. Give them free range, and in addition to their usual evening feed of maize, during the first week of December give one of wheat or maize in the morning, and during the second and third weeks three meals a day, each one containing, in addition to wheat or maize, some crushed monkey nuts or sunflower seeds. Plenty of thick milk and chopped-up onions or onion tops should also be given.



Those who go in for ducks should feed well and get as many to marketable size as possible by Christmas, when they usually fetch good prices. They should be kept in a small run; nearly all their food should be wet mash, bran, pollard, maize meal, meat meal and milk, as much as they will eat three times a day, i.e., they should practically be allowed to spend their existence eating and sleeping. Big duck breeders often give a fourth meal by lamplight at 10 p.m., and the first meal is given at sunrise.

#### STOCK.

Cattle.—Ranching cattle should not require any attention beyond dipping, but any stock that are in weak condition will be the better for a little hay or a pound or two of maize at night until they have regained strength. The bulls should be returned to the herd either at the end of the month or in January, and it should be remembered that the better they are conditioned and fitted for their work the more hope there is of a good crop of calves. For this reason also every effort should be made to have all the female stock in strong condition. Dairymen will find that as the grass becomes lush and rank a supply of sweet veld hay, teff hay or, say, three pounds of crushed maize given in the sheds at night will enhance both the quality and quantity of the milk. This will be found to be the case more particularly in districts of heavy rainfall. Milch cows should be protected as much as possible from cold rains and hot sun. Yarding all night in a clean kraal provided with a simple lean-to shed well bedded up will be found to be very beneficial in seasons of protracted rainfall. The calf pen should be kept clean, dry and sweet, and young calves will be better kept in during very hot or very wet weather. Dipping should be regularly attended to.

Sheep.—Graze on the higher lands, keeping the kraals clean, dry and airy, and watch for ticks.

#### TOBACCO.

Continue preparation of land. The best results are obtained by transplanting on freshly prepared soil. Transplanting should be pushed on with as fast as transplants and climatic conditions will allow. As soon as plants begin to grow, go over the field and fill in all missing hills with strong selected plants, and then apply fertiliser to hasten growth and ensure early maturity. Cultivation should be commenced as soon as the plants start growing, especially on sandy soils. The crust caused by heavy rains should be pulverised through cultivation as soon as the surface soil is dry enough for tillage; this gives the young plants the benefit of the moisture stored in the soil. Do not neglect the late sown seed beds. Make every effort to finish transplanting before the end of the month, so that the crop will be harvested before dry, cool weather begins.

#### VETERINARY.

Occasional cases of horse-sickness may occur during this month. With the great increase in ticks, due to the heat and moisture, cases of redwater and gall-sickness may be expected, more especially amongst Colonial stock imported since the last rainy season. The cool weather which frequently follows the early rains is an excellent time for castrating calves and other animals.

#### WEATHER.

In Mashonaland the rainfall during this month varies from eight inches along the eastern border to six inches in the west. In Matabeleland it varies from five-and-a-half inches in the west to four-and-a-half inches in the south. Considerable divergencies from these normals may occur in individual seasons, but on the whole this month is the most regular in its behaviour. Very heavy downpours may be looked for, and it is well to be provided by drains and ditches against the effects of very heavy rain storms. A dry spell about Christmas time is a very frequent, though



not invariable, even in Rhodesia. This partial drought may last only a fortnight, or may extend to six weeks, in the latter event often causing some anxiety regarding young crops, especially those not yet through the ground. The best means of meeting this condition of the weather is by frequent surface cultivation by harrow or horse hoe to preserve a loose soil mulch on the surface and prevent losses of soil moisture by evaporation.

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## January.

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### BEE-KEEPING.

This month is a slack one for actual hive work. Each hive should continue to be carefully watched to see that any attempt by the wax moth to gain a footing is at once stopped. In the great heat of this month, see that proper ventilation is supplied, as well as enough water. Precautions against the depredations of white and other ants should also be watched daily. Where possible, examine now and again the brood chamber for queen cells, and destroy them if not wanted. Requeening can be done where desired on the uniting system, if the apiarist does not know of the better plan of rearing his own queens. In the workshop have a spare hive or two complete and ready for occupation, well painted, for any new swarms that may be required in the coming months. Though the second honey flow of the season is not due to start until about March or April, there should be ample stores coming in meanwhile to keep all bees busy in breeding, nursing, and bringing the hive generally to full strength for the winter, as well as for their own daily food supplies. There will not be enough honey coming in now for surplus purposes, therefore see that the supers are not left on the hives to a greater degree than to give the inmates plenty of room to loaf in.

### CITRUS FRUITS.

The planting of citrus trees should be completed if possible by the end of the month, for trees planted later may not harden up before the winter; they then become susceptible to winter injury from cold.

This month is the best one for planting shelter belts to protect all varieties of fruit trees from the prevailing dry winds.

Cover or green crops may be planted during this month; if the grove has been over-run with grass or weeds, sow the cover crop seed more thickly. This will assist in smothering future weed growth.

Continue suppressing any undesirable shoots that may develop on the tree trunk or other parts of the tree.

Drain any depressions that allow rain or irrigation water to accumulate at the base of the trees, for trees permitted to stand in water will speedily fall victims to disease or pest injury.

### DECIDUOUS FRUITS.

Continue planting cover or green crops between the trees. These crops may then be turned under towards the end of the rainy season to furnish the necessary humus.

Summer pruning may be continued. Rub or break out any undesirable shoots that have a tendency to crowd each other; suppress all growths on the main stem from the ground level up to the main arms of the tree, for these are unnecessary. If next year's fruit crop is to be of good size and quality, the inner fruiting wood of a tree must receive

sufficient air and light to mature fully. If the new growth is too dense it will prevent the fruiting wood from maturing, and poor crops will be the result. The thinning out of the summer growth will overcome this crowding and weakening of the fruiting wood.

Many fruits will be ripening during the month. Do not permit the fruit to become over-ripe on the trees; rather harvest it at the correct stage and store or sell the surplus.

Plant shelter trees if the orchard is exposed to the prevailing winds, as good crops of fruit cannot be expected from inadequately protected fruit trees.

### CROPS.

If not already sown, put in the ensilage and fodder crops at once, such as maize and legumes, oats and other hay grass crops.

Sow short season crops like haricot beans, linseed, buckwheat, peas, summer oats, gram and mung bean.

Plant out grasses and kudzu vine for pasture.

Ridge potatoes and cultivate thoroughly. Main crop can still be planted.

Quick growing green manuring crops, such as cowpeas, soya beans and sunn hemp, may still be sown this month.

Earth up ground nuts so that a small amount of loose soil is thrown over the crowns of the plants. This assists the formation of nuts.

If not already done and where practised, legumes or long season oats such as Algerian can be sown under the maize crop for grazing and to add nitrogen and humus to the soil.

Cultivate all growing crops well, and thoroughly eradicate weeds.

Overhaul all hay-making implements and ploughs and get in thorough repair in preparation for the haying and ploughing seasons.

Endeavour to mow grass fields early for hay and litter, and to obtain second cutting for hay in April.

Fallowed lands or fields not yet planted may be disc-harrowed or ploughed to prevent weeds from seeding.

Mow grass paddocks infested with annual weeds to prevent the weeds seeding.

Prevent Mexican marigold and other noxious weeds seeding by hoeing or pulling out the plants by hand.

Keep a sharp look-out for maize stalk borer. Cut off the tops of infested plants or treat them with a recognised chemical preparation. If topping is practised, remove tops from land, and bury, burn or feed them at once to farm stock.

Watch the maize lands for witch weed. Prevent witch weed plants from seeding by cultivation and by hand-pulling the plants.

Make as much manure as possible by placing grass and litter in cattle kraals, pig sties and stables.

If there is stumping and clearing to be done, push on with it. Endeavour to get as much of the new virgin land as possible broken up during this and the two following months.

### DAIRYING.

(See December.)

### ENTOMOLOGICAL.

Maize.—Late planted crops are subject to attack by snout beetles, grasshoppers and crickets. Poisoned bait is a useful remedy. Write for particulars. Plants infested with stalk borer may be cut out, removed



from the land and destroyed. Crops planted after the new year are frequently attacked very heavily by stalk borers of the second brood (February to March) and are commonly of little value, except for ensilage. If the lands are allowed to become weedy, especially with grasses, during this month, loss may occur from leaf-eating caterpillars when the lands are cultivated. Danger from the army worm is also greater in weedy than in clean lands.

**Tobacco.**—Most pests of this crop may be active during January, e.g., wireworms, surface beetles, crickets, grasshoppers, stem borer, leaf miner, etc. Consult article on tobacco pests in "Rhodesia Agricultural Journal," January, 1928.

**Potato.**—This crop may be sprayed with arsenate of lead (powder) 1 lb. in 25 gallons of water if attacked by leaf-eating ladybirds, blister beetles or other leaf-eating insects. This poison may be combined with Bordeaux mixture when spraying against early blight.

**Kitchen Garden.**—Marrow and cucumber plants about to set fruit may be sprinkled regularly with the following formula to destroy fruit flies which "sting" fruit:—Arsenate of lead (powder)  $1\frac{1}{2}$  ozs., molasses  $\frac{1}{2}$  gallon or cheapest sugar  $2\frac{1}{2}$  lbs., water 4 gallons. To destroy leaf-eating insects generally dust plants with arsenate of lead (powder) 1 part in 20 parts of finely ground maize meal or finely sifted slaked lime. Aphides (plant lice) may be treated with soap 1 lb. in 5 gallons of water, or tobacco wash, or simply by regular spraying with a forceful stream of cold water from a spray pump.

**Fruit Trees.**—Deciduous fruits are subject to attack by large beetles, which should be destroyed by jarring into a net and dropping thence into a tin containing water with a film of paraffin oil on the surface. Trees should be covered in mosquito netting to protect the fruit from fruit-piercing moths. The large adult beetles of the fig borer may be seen on the young shoots and should be destroyed. Borers in the trunks of the trees may be killed by injecting a little carbon bisulphide.

**Mosquitoes, House Flies, etc.**—Screen windows and doors. Destroy breeding places around homestead. House flies may be poisoned cheaply with sweetened arsenite of soda solution. Write for directions.

**When in doubt as to the identity of any pest or the method of dealing with it, apply promptly to the Chief Entomologist, Salisbury, bringing or sending specimens of the insects concerned. Note, however, that it is sometimes feasible to prevent injury from pests for which no practical remedy is known. Farmers should therefore endeavour to obtain some knowledge of the pests of the crops they are growing through the articles published in this Journal.**

#### FLOWER GARDEN.

This month requires all one's energy in the flower garden. Annuals may still be sown for late flowering before the season is over. Planting out should be done as early as the weather permits, and advantage taken of a dull day after a shower for this work. If care be exercised much smaller plants may be put out than would at first be thought advisable, as with attention these will make stronger plants than larger ones, which are more likely to receive a check. The soil requires constant stirring, owing to the packing caused by the rains and for the eradication of weeds, which are now very troublesome. All plants should be kept free of dead and decaying matter.

#### VEGETABLE GARDEN.

Turnips, carrots, cabbages, lettuce, etc., may be sown for carrying on during the winter months. Potatoes may be planted this month for keeping through the winter. Weeding and cultivating between the rows should be continually carried on.



## FORESTRY.

If the rains are seasonable, plant out evergreen trees, such as gums, cypress, pines, etc. Fill in all blanks as soon as they are noticed, and do not leave them until the following season. Planting should be done on a wet day, or, failing that, on a dull day, or late in the afternoon. Great care should be taken to see that the trees are not planted out any deeper than they stood in the tins.

## POULTRY.

The continuance of the long spell of hot, dry weather has been finding out the weak spots in the constitution of many birds. Naturally those that are strong and vigorous come through it well and do their duty; the weaker ones stop laying. To a large extent, however, the remedy is in the hands of the poultry breeder. If he treats the birds properly, *i.e.*, makes them take plenty of scratching exercise, lessens the amount of heating and fattening food given and increases the amount of cooling foods, *e.g.*, green food, thick milk, etc., his birds will come through the hot, dry weather well, and also lay well. However, the hot, dry period should nearly be at an end now, and the poultry keeper has to take precautions whereby the wet weather will not affect his birds' health and their laying powers. All houses must be absolutely watertight, the floor raised well above the level of the surrounding ground, thus preventing water seeping in and making it damp. The birds themselves should not get wet, and no pools of water should be seen in the runs.

Foodstuffs must be kept absolutely dry, otherwise they will become mouldy and sour, causing disturbance of the intestinal tract, illness, and perhaps death; certainly a diminution in the number of eggs.

Some of the birds will now be in moult. To get them through it quickly give more sunflower seed, some monkey nuts, plenty of green food, especially cabbage, kale, etc., plenty of milk or some meat, a little sulphur in the dry mash (one teaspoonful to 1 lb.); also stew two dessert spoonfuls of linseed in a pint of water to a jelly, mix this to a crumbly consistency with mealie meal or bran, and give about one dessert spoonful to each bird daily. Get the birds through the moult as quickly as possible. Keep the birds dry during the rains, otherwise the egg output will decrease.

Do not hatch any more turkeys till after the rainy season is over. Any birds other than turkeys destined for the Christmas markets should be penned up in crates for a fortnight before killing and fed well. Turkeys should not be penned up, but allowed on free range; those for the Christmas market should be given more food.

Those who go in for ducks should feed well and get as many to marketable size as possible by Christmas, when they usually fetch good prices. They must be treated in almost exactly the reverse manner to what turkeys are. They should be kept in a small run; nearly all their food should be wet mash, bran, pollard, mealie meal, meat meal and milk, as much as they will eat three times a day, *i.e.*, they should practically be allowed to spend their existence eating and sleeping. Big duck breeders often give a fourth meal by lamplight at 10 p.m., and the first meal is given at sunrise.

## STOCK.

Cattle.—The recommendations for December apply equally to this month. Bulls should be returned to the herd during the month if a September or October calving season is desired.

Sheep.—Continue as recommended for December. If heavy rains are experienced a daily ration of a quarter of a pound of maize per ewe will keep them in condition, and will often prevent much trouble arising from poverty and anæmia. Those who favour autumn lambs must put the ram again with the flock in February, and should therefore now take steps (if necessary) by supplying a little extra feed as above recommended to fit the ewes for

mating. A little forethought of this kind will tend to increase the stamina of the lambs and to bring the ewes in season more or less together, so that a protracted lambing season is avoided.

#### TOBACCO.

Cultivation should be systematically continued, and no foreign vegetation allowed in the tobacco field, as weeds and grass induce insect attacks. All backward plants should be given special attention, and an additional application of fertiliser to hasten growth, so that the plants ripen as uniformly as possible. Curing barns should be placed in proper condition on rainy days, and all tobacco appliances should be placed in proper order for the rush of work during the curing season. Early planted tobacco may be ready for topping during the latter part of the month, and the common mistake of topping too high should be avoided. Go over the field carefully and select typical, uniform and disease-free plants for producing seed for next season's crop. All plants should be properly primed at the same time that the tobacco is topped.

#### VETERINARY.

Horse sickness may now be expected, especially in districts where early heavy rains have occurred. Blue tongue in sheep will also be prevalent.

#### WEATHER.

Heavy rain is to be looked for, and during this month we may normally expect nine to twelve inches on the eastern border, eight in the north, and seven to seven and a half as one travels westwards or southwards. At this time of the year the rainfall tends to be heavier in the eastern than in the western portions of the Territory, whilst prolonged steady rains take the place of the thunder showers which marked the earlier part of the wet season. The growing period is at its height, and high temperatures are registered.

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## Notes from the "Gazette."

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"Gazette"  
Date.

Items.

#### ROADS.

- 16.11.28. The following has been declared a branch road:—Starting from the southern boundary of Aberdeen Farm and proceeding in a south-easterly direction; thence east across Crebilly Farm into Gowrie Farm; thence proceeding south across that farm to the Hunyani River, joining up with the road to Norton. (G.N. 763.)
- 16.11.28. The following has been declared a district road:—From a point on the Kimberley Farm north of Bindura; thence in an approximately direct line across the said farm, the south-east corner of the farm Claverhill and the farm Melfort; thence across the northern corner of Stella to the bridge on the Mazoe River. (G.N. 764.)
- 26.10.28. His Excellency the Governor has been pleased, in terms of section 1 of the "Road Alteration Ordinance, 1903," to approve of the closure of that portion of the road from the Borrowdale Store where it crosses the southern boundary of Lot "H," Borrowdale, to its junction with the Luna Farm, Salisbury-Borrowdale Road. (G.N. 710.)

*"Gazette"**Items.**Date.*

- 9.11.28. His Excellency the Governor has been pleased, in terms of section 1 of the "Road Alteration Ordinance, 1903," to approve of the closure of the road running from the Inkomo-Biton branch road in a south-easterly direction over the farms Syston and Lily. (G.N. 751.)
- 9.11.28. The following has been declared a district road:—Starting from the Serui River on Glenside boundary and proceeding in a general northerly direction through the farms Donnington, Bryn, Lancaster, and proceeding along the western boundaries of Eland Fountain and La Esmeralda to Lydiate Station. (G.N. 759.)

## POUND.

- 16.11.28. A pound has been established on Lorn Farm, Odzi, Makoni district. (G.N. 762.)

## AFRICAN COAST FEVER.

- 26.10.28. Government Notice No. 476 of 1928 is cancelled. The following farms in the Umzingwane, Matobo and Gwanda native districts are released from all restrictions:—Longfield, The Range, Emangeni, Adams and Matobo Reserve. (G.N. 713.)
- 2.11.28. The following area in the Bikita native district is declared an area of infection:—A portion of the Angus Ranch and of the Crown land south of the Turgwe River, bounded on the north by the Turgwe River, on the east by the Sabi River, on the south and west by a fence. (G.N. 726.)

## IMPORTED WHEAT.

- 26.10.28. His Excellency the Governor-in-Council has been pleased, under the powers conferred by section 16 of the "Customs and Excise Tariff Act, 1926," to approve of a rebate or refund of the Customs duties on wheat imported by a *bona fide* miller or milling company when such wheat is used and blended with wheat grown and produced in this Colony in the process of manufacture of flour or meal; provided that such flour or meal in its finished state shall contain not less than 20 per cent. of the products of this Colony.

Such rebate shall be subject to such conditions as the Controller may impose for the purpose of safeguarding the revenue. (G.N. 709.)

**FOR SALE.**

Middle White Pigs.

Apply in the first instance to the Chief Agriculturist,  
Department of Agriculture, Salisbury.



## Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

### AGRICULTURE AND CROPS.

- No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
- No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
- No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
- No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
- No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
- No. 374. Fibre Crops, by J. A. T. Walters, B.A.
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- No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.
- No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.
- No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.
- No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
- No. 539. Barley Growing.
- No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
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- No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.
- No. 550. Onion Growing under Irrigation, by C. Mainwaring.
- No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
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- No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
- No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
- No. 591. Maize Export Conference Proceedings.
- No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
- No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
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- No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
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- No. 627. The Growing of Potatoes in Southern Rhodesia (Revised), by C. Mainwaring, Agriculturist.
- No. 630. The Storage of Seed Potatoes, by H. C. Arnold.
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- No. 643. Noxious Weeds in Southern Rhodesia, by F. Eyles, Botanist.
- No. 650. Coffee Culture in Southern Rhodesia, by G. W. Marshall, Horticulturist.

- No. 651. Two Important Leguminous Crops: The Velvet Bean and Dolichos Bean, by C. Mainwaring, Agriculturist.
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- No. 681. The Sunflower (*Helianthus Annuus*) (Revised), by S. D. Timson, M.C., Dip.Agric.
- No. 684. Warning to Maize Growers: Maize for Export.
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- No. 695. The Castor Oil Plant (*Ricinus* spp.), by S. D. Timson, M.C., Dip.Agric.
- No. 697. Results of Analysis of Samples taken under the "Fertilisers, Farm Foods, Seeds and Pest Remedies Ordinance" during the year 1927-28.
- No. 704. The Importance of Research on Pasture Improvement in Southern Rhodesia, by A. D. Husband, A.I.C., Chief Chemist.
- No. 705. Suggested Cropping Programmes for Farms on the Sand Veld, by D. E. McLoughlin, Assistant Agriculturist.
- No. 706. A Farmers' Calendar of Crop Sowings, by C. Mainwaring, Agriculturist.
- No. 708. Witch Weed or Rooibloem (*Striga Lutea*)—a Serious Menace to Maize, by J. A. T. Walters, B.A., F.R.S.A., Agriculturist.
- No. 709. Sand Veld Farming and its Possibilities, by E. D. Alvord, M.Sc. (Agr.).
- No. 710. Monthly Reminders for the Farming Year, by the Division of the Chief Agriculturist.
- No. 713. Ensilage, by J. A. T. Walters, B.A., Agriculturist.
- Botanical Specimens for Identification.
- Maize Grading Regulations.

## REPORTS ON CROP EXPERIMENTS.

- No. 94. Second Report on Experiments, by J. H. Hampton.
- No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
- No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
- No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
- No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
- No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
- No. 262. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
- No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.
- No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.
- No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.
- No. 352. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.
- No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.
- No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.
- No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G. Mundy, F.L.S., and E. E. Wright.
- No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.



- No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.  
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 No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.  
 No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.  
 No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.  
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 No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.  
 No. 608. Annual Report of Experiments, 1924-25, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.  
 No. 631. Bulawayo Experiment Station: Annual Report for Year 1925-26, by H. W. Hilliard.  
 No. 649. Annual Report of Experiments, 1925-26, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Manager.  
 No. 675. Bulawayo Experiment Station—Annual Report for Year 1926-27, by D. E. McLoughlin.  
 No. 683. Annual Report of Experiments, 1926-27, Agricultural Experiment Station, Salisbury, by H. C. Arnold, Station Manager.  
 No. 685. Notes on Farm Practices at the Government Farm, Gwebi, by S. D. Timson, M.C., Dip.Agric.  
 No. 688. Report, 1923-24—1926-27, Gwelo Municipal Demonstration Stations, by D. E. McLoughlin.  
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## TOBACCO.

- No. 605. Flue-Curing Tobacco Barns, Bulking and Grading Sheds, by P. H. Haviland, B.Sc. (Eng.), Acting Government Irrigation Engineer.  
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 No. 614. Notes on Installing the Johnson Patent Furnace, by B. G. Gundry, Office of Irrigation Engineer.  
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 No. 629. Notes on Flue Curing of Tobacco, by C. A. Kelsey Harvey.  
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 No. 653. The Care of Tobacco Seed Beds, by J. C. F. Hopkins, B.Sc. (Lond.), A.I.C.T.A. (Trinidad).  
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## LIVE STOCK.

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- No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.
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- No. 338. From Breeder to Butcher; Beef Feeding Experiment No. 5, by E. A. Nobbs, Ph.D., B.Sc.
- No. 381. From Breeder to Butcher; Cattle Feeding Experiment No. 8, by Eric A. Nobbs, Ph.D., B.Sc.
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- No. 446. From Breeder to Butcher; Cattle Feeding Experiment No. 11, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc., F.H.A.S.
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- No. 468. From Breeder to Butcher; Cattle Feeding Experiment No. 13, by Eric A. Nobbs, Ph.D., B.Sc.
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- No. 703. Dairy Buildings in Southern Rhodesia: Cow Byre—Type II, by B. G. Gundry, Irrigation Branch.
- No. 711. Dairy Buildings in Southern Rhodesia. A Small Farm Dairy, by B. G. Gundry, A.L.Mech.E.



## VETERINARY.

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- No. 313. Obstruction in Sheath of Ox, by J. M. Sinclair, M.R.C.V.S.
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- No. 536. Inoculation of Cattle against Redwater and Gall Sickness, by Ll. E. W. Bevan, M.R.C.V.S.
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- No. 642. The Laboratory Diagnosis of Animal Diseases, by Ll. E. W. Bevan, M.R.C.V.S.
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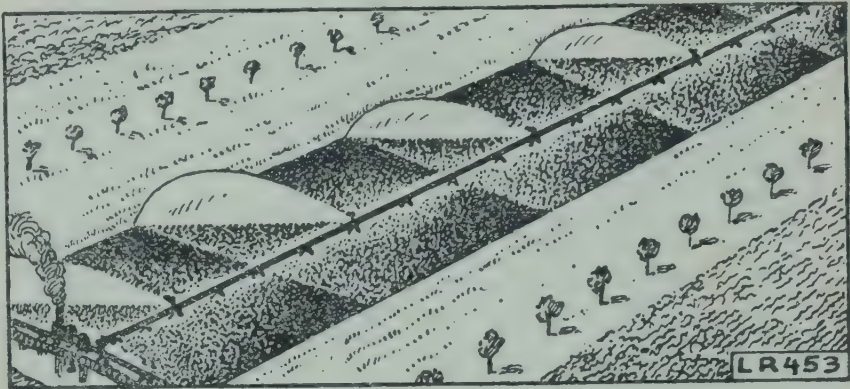
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